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ABSTRACT

The monograph on the North Alaskan dialect of Inupiaq, an Eskimo language, makes a phonological comparison of the two sub-dialects, Barrow and Kobuk. An introductory section outlines basic word structure and standard orthography, and gives an overview of the dialects' phonology. Subsequent sections give an extensive phonological analysis of these patterns and processes: consonant assimilation; assibilation and palatization; and consonant gemination. In general, a synchronic perspective is taken, although some consideration is given to historic factors. Loan words and changes possibly attributable to contact with English are also explored briefly. Contains 54 references. (MSE)

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ALASKA NATIVE LANGUAGE CENTER RESEARCH PAPERS

Number 6

PHONOLOGICAL ISSUES IN NORTH ALASKAN INUPIAQ

Lawrence D. Kaplan

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by

Lawrence D. Kaplan

1981

Alaska Native Language Center
University of Alaska Fairbanks
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ABBREVIATIONS

1	first person
2	second person
3	third person
4	fourth person
abl	ablative case
abs	absolutive case
aeq	aequalis case
AI	North Alaskan Inupiaq
B	Barrow
BS	Bering Strait
C	consonant
cop	copular
CY	Central Yupik
d, dl	dual
fut	future
I	Inupiaq
imp	imperative
inst	instrumental
int	intransitive
inter	interrogative
K	Kobuk
KI	King Island
loc	locative
mod	modalis case
neg	negative
nom	nominal
opt	optative
p, pl	plural
PB	Point Barrow
PE	Proto Eskimo
poss	possessive
real	realized
rel	relative
rep	reportative
s, sg	singular
SLI	St. Lawrence Island
SP	Seward Peninsula
sub	subordinative
term	terminalis case
tr	transitive
unreal	unrealized
V	vowel
WG	West Greenlandic

PREFACE

The Eskimo-Aleut language family has two branches, Aleutian Aleut and Eskimo. Within Eskimo are four languages of which three are Yupik -- Central Yupik, Siberian Yupik, and Alutiiq (also called Sugpiaq) -- and the other Inupiaq. Inupiaq is the Alaskan name for the continuum of dialects spoken from Unalakleet, Alaska across the Alaskan and Canadian Arctic to Greenland. The Inupiaq branch of Eskimo is otherwise known as Eastern Eskimo and has also been called "Inupik" by Morris Swadesh, who erroneously identifies "inupik" as the Barrow word for "real person" (1951:69). The correct word with this meaning is iñupiaq, and it is doubtful that any dialect actually uses "inupik."

Alaskan Inupiaq can be divided into two major dialect groups, each of which can be further subdivided into two dialects. The first group, North Alaskan Inupiaq, is spoken from Unalakleet at its southernmost boundary, north along the head of Norton Sound, through the Kobuk River valley, around Kotzebue Sound and the northern shore of the Seward Peninsula and north along the Arctic coast, including the inland village of Anaktuvuk Pass, and into the Mackenzie River delta region of Northwest Canada. Within North Alaskan Inupiaq, we can identify a North Slope dialect

spoken from Kivalina north and east along the Arctic coast into Canada (see also 3.1), and a Malimiut dialect spoken south of Kivalina, predominantly in the Kobuk River area, Kotzebue Sound, and the head of Norton Sound, excluding most of the Seward Peninsula. The dialect of Anaktuvuk Pass, home of the Nunamiut Eskimos, represents in several respects a dialect transitional between Malimiut and North Slope, with individual speakers tending in one direction or the other. The division between these two dialects is based principally on differing degrees of consonant assimilation and palatalization.

While all forms of North Alaskan Inupiaq have some degree of consonant palatalization, it is the lack of this feature, together with the development of an elaborate "consonant weakening" system, which characterizes the other major dialect group, Seward Peninsula Inupiaq, in phonological terms. Consonant weakening affects alternate syllables, causing lenition or deletion, and this syllable-skipping mechanism, rather than its result, is reminiscent of prosodic processes of Alaskan Yupik, a probable substratum. Seward Peninsula Inupiaq comprises the Bering Strait and Qawiaraq dialects: the Bering Strait variety is found in the western portion of the Seward Peninsula, including King Island and the Diomedes. The southern shore of the peninsula is Qawiaraq-speaking, with this dialect extending along Norton Sound to Shaktoolik and Unalakleet, sharing these two villages with Malimiut Inupiaq as well as the Unaliq

dialect of Central Yupik. (Unaliq was once spoken well north of its present boundary, along the shore of Norton Sound to Cape Nome.)

Considered here are the Barrow and Kobuk dialects of Inupiaq, which we refer to together as North Alaskan Inupiaq. Barrow, on the Arctic coast, is the northernmost point in Alaska as well as on the North American continent (see Appendix I for a map of Alaska). Since the town began gaining importance as a center for commerce with whaling crews and traders in the latter half of the nineteenth century, Eskimos from inland and elsewhere along the coast have moved to Barrow, creating a melting pot of North Alaskan dialects. The original settlement in the area, Point Barrow, was located about ten miles from the site of Barrow itself. About twenty-five years ago, the last inhabitants of the village of Point Barrow -- Nuvuk in Inupiaq, meaning 'point' -- moved the short distance to Barrow. The Point Barrow dialect, which is somewhat divergent from what is spoken by most Barrow people, is now the language of only a small number of older people and will soon disappear.

Despite the original variety of dialects, a standard language of sorts has developed in Barrow, especially among second and third generation residents. The Barrow data used in this work are of this standard dialect, except where otherwise indicated, especially in the case of Point Barrow forms.

The Kobuk River flows west across northwest Alaska,

emptying into Kotzebue Sound (see Appendix I). Along its banks are the villages of Kobuk, Shungnak, Ambler, Kiana, and Noorvik, comprising the dialect area where Kobuk Inupiaq is spoken. The former three villages are referred to as the "upper Kobuk" and the latter two as the "lower Kobuk"; linguistic differences between the two are minor indeed and are mostly lexical and morphological in nature. The village of Selawik, situated to the south of this area, has a very similar dialect to that of the Kobuk. Distinct from Barrow, this region has had comparatively little influx of Eskimos from other dialect areas; if anything, it seems to be the Kobuk people who have moved elsewhere.

In this work we treat phonological issues of both the Barrow and Kobuk dialects, comparing them where they differ. With Barrow representing the North Slope -- excepting the divergent dialects of Point Hope and Anaktuvuk Pass -- and Kobuk representing the Malimiut dialect, we are able to treat one of the two major dialect groups, North Alaskan Inupiaq. The other, Seward Peninsula, appears different on several major points when compared with the rest of Inupiaq and will be referred to only occasionally in this work.

As with most other Alaskan native languages, the future of Inupiaq appears uncertain at this point in history. A complex set of circumstances, owing to the introduction of foreign culture and language into the Arctic over the past century, threatens the continued use of

Inupiaq as a primary source of communication in areas of Alaska where it is traditionally spoken. Following official discouragement of the language in the schools over past decades, younger generations speak ever more English and less Inupiaq, a trend which would result in the eventual replacement of Inupiaq by English. Most areas have started Eskimo language teaching programs in local schools, but it is unclear what effect such efforts will have on future maintenance -- or revival, where necessary -- of spoken Inupiaq in Alaska. By contrast, throughout all of Greenland and much of eastern Canada, with the apparent exception of Labrador, the language remains in full vigor.

Of all the Inupiaq dialects, West Greenlandic has received the most attention by linguists. Following several early grammars produced by missionary linguists such as Paul Egede (1760), came the monumental Grammatik der Grönländischen Sprache of Samuel Kleinschmidt in 1851. The linguistic analysis contained in this work is truly remarkable and demonstrates Kleinschmidt's deep understanding of Greenlandic. In the tradition of this landmark of the field, more recent linguists have produced works also of high quality. Schultz-Lorentzen's dictionary (1927) and grammar (1945) of West Greenlandic are well known and widely available treatments. The most thorough and rigorous works since Kleinschmidt are certainly Knut Bergsland's A Grammatical Outline of the Eskimo Language of West Greenland (1955) and Jørgen

Rischel's Topics in West Greenlandic Phonology (1974), which are referred to frequently in this thesis. Robert Underhill, in a series of articles, and Stephen Anderson (1974) have also proposed phonological analyses of West Greenlandic which relate directly to the concerns of this work. More recently, the proceedings of an international conference on Eskimo linguistics held at the University of Chicago in 1970 have appeared in Papers on Eskimo and Aleut Linguistics (1976). For an extensive account of material available on and in Eskimo as well as a wide range of generally pertinent information, see Krauss (1973).

Canadian Inupiaq has been the subject of significantly less linguistic investigation than Greenlandic, and Alaskan Inupiaq has been explored least of all. In 1968 Donald Webster of the Summer Institute of Linguistics published a brief "teach yourself" type grammar of the Barrow dialect entitled Let's Learn Eskimo. In 1970 the Summer Institute of Linguistics published the Iñupiat Eskimo Dictionary, incorporating Wilfried Zibell's lexical material for the Kobuk dialect along with Webster's Barrow entries. More recently, vigorous work on Alaskan Inupiaq has been undertaken by members of the Alaska Native Language Center, especially Edna MacLean and myself, resulting in a college level teaching grammar and classroom dictionary of the Barrow dialect and literacy materials for both Barrow and Kobuk. Dictionary work is continuing with a major Barrow

dictionary forthcoming, supplemented by material collected at Point Hope and Anaktuvuk Pass. Grammatical and lexical work is also under way for King Island, one of the Bering Strait dialects. In addition, local bilingual education programs and other efforts concerned with promoting the use of the language are producing written materials in Inupiaq, primarily for use in the schools. Most outstandingly, fine work in Inupiaq materials production has been done by the Inupiaq Materials Development Center of the North Slope Borough School District and by the National Bilingual Materials Development Center in Anchorage.

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The preparation of this work has depended on a close working relationship with a number of Inupiaq people. Of these I extend special thanks to Edith Rowray and Edith Tegoseak, originally of Barrow, as well as Violet Pungalik of Noorvik. In addition I acknowledge the contribution which numerous teachers of Inupiaq around the state have made to my understanding of their language as we have worked together.

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has offered valuable comments on this monograph. I am grateful also to Jørgen Rischel for providing detailed comments on an earlier version of this manuscript and for discussing with me many of its crucial ideas based upon his own work with West Greenlandic.

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CHAPTER I: Introduction

1.1 Basic word structure

Inupiaq is a polysynthetic language and permits extensive affixation; for this reason it will be useful to explain what is meant by the term "word" as applied to this language. Rischel (1974:11) makes reference to the phonological word or wordform in which he finds a "convergence of phonological and syntactic characteristics," and a "whole which is rhythmically inseparable." Based upon the same criteria, the phonological word may also be established as a unit for Alaskan Inupiaq, where it is generally a complex string of formatives within which internal pauses are not possible, as Rischel observes. Phonological words are inflected and have reality for speakers as discrete units, since speakers first acquiring literacy skills in Alaskan Inupiaq have no trouble identifying individual words.

Wordforms are built upon a stem,[1] either verbal or nominal in nature, which may be expanded by any number of morphemes, generally suffixal. Only one prefix, ta-, used exclusively with demonstratives, exists in the language. Noun stems may be free-standing, e.g. qayaq 'kayak', and

---

1. By "stem" here we mean an essential, synchronically unanalyzable morpheme, although we also refer to derived stems simply as "stems."

are in most cases equivalent to the singular form. Verb stems on the other hand must be followed by at least an inflectional ending, and for this reason we write them with a following hyphen, e.g., iga- 'cook'. The isolated verb stem, while morphologically abstract, is accessible to speakers and is used in citation form. We use "stem" to mean either a basic, unanalyzable morpheme (e.g., iga-) or else such a unit which has been expanded by one or more derivational morphemes (B igasuk- 'want to cook'). "Suffix" is a general term for those bound morphemes, either inflectional or derivational, which may follow a stem. More specifically, derivational morphemes are known as "postbases" and inflectional morphemes as "endings" or "inflections." Following endings are optionally found "enclitics." This terminology is in general use throughout much of Eskimo linguistics and should conflict with no other usage that we know of.

Derivational suffixes, or postbases, may be affixed to either noun or verb stems, resulting in an expanded stem which is either noun or verb. Postbases which attach to noun stems and yield nouns we call "nominal," sometimes abbreviated (N-N). "Verbal" postbases, (V-V), similarly maintain stems as verbs. "Denominal" or "verbalizing" morphemes (N-V) change nouns to verbs, while "deverbal" or "nominalizing" morphemes (V-N) change verbs to nouns.

Inflected verbs are either transitive or intransi-

tive, the former marked for person and number of both subject and object and the latter for person and number of the subject only. Our corresponding system of abbreviation is exemplified by the following: iggaun 'cook it!', imp 2s-3s, where 2s indicates a second person singular subject and 3s a third person singular object; igaviñuk 'are we$_2$ cooking?', inter 1d, where 1d denotes a first person dual subject and no object, i.e., an intransitive verb. Inupiaq plurals are translated simply with English plurals; dual forms are rendered by the English plural with a subscript 2, e.g. qayyak 'kayaks$_2$', and similarly for other forms whose number may be unclear in English translation, e.g., 'you$_1$'.

Slanted lines (//) indicate either an underlying representation or intermediate stage of a derivation; where crucial, their exact use in a specific instance will be made clear. Square brackets ([]) indicate phonetic transcription. Underlined forms are surface representations of Inupiaq words or morphemes written in standard orthography (see 1.2).

1.2 The standard orthography

The orthography in current use for Alaskan Inupiaq was developed by Roy Ahmaogak, a North Slope Inupiaq, and Eugene Nida, a member of the Summer Institute of Linguistics, in the late 1940's. Their original writing system

has undergone several significant changes since its inception, but we will not recapitulate its history here (see Krauss 1973:830 and n.d.). Inupiaq forms given here will be written in the standard orthography in preference to another system for two reasons: first, the standard orthography provides an accurate means of representing the language; and second, its use will help make this work accessible to literate speakers of Inupiaq.

Essentially autonomous phonemic in nature, the standard orthography does not always succeed in adhering to the principle of "one phoneme, one symbol." Fortunately, the inconsistencies occur with sounds which are comparatively rare, as will be explained below. The following table represents the consonant system of Barrow and Kobuk Inupiaq. Symbols with no brackets are autonomous phonemes, each of which corresponds directly to a symbol in the orthography. Angle brackets indicate standard orthography where it differs from phonetic notation. Square brackets indicate consonants which are present phonetically but analyzed as allophonic and needing no distinct orthographic representation, written instead with the symbol in angle brackets to the right.

[ʔ] is not present in Barrow Inupiaq, and [h] is very limited in its distribution, occurring postconsonantally in some speech and otherwise only in occasional exclamations. In Kobuk, [ʔ] is written intervocalically as <'> and is otherwise found predictably between a stop and a following continuant,

Table 1.

The consonant system of Barrow and Kobuk Inupiaq.

p		t		č/t^{y}	⟨ch, ṭ⟩	k		q		ʔ	⟨'⟩		
[f]	v	s		[ç]	⟨s⟩	x	⟨kh,k⟩	χ	⟨qh,q,h⟩	h			
v				[j]	⟨y⟩	ɣ	⟨g⟩	ʁ	⟨ġ⟩				
		ɬ̥	⟨ɬ⟩		ʎ̥ ⟨ɬ̇⟩								
		l			ʎ ⟨l̇⟩								
m		n			ñ	ŋ		ɴ	⟨ġ⟩				
		ř	⟨r⟩										
		ɽ̥	⟨sr⟩										
				y									

when it is not written, e.g. qipmiq [qip?miq] 'dog'. Kobuk [h] is found following another consonant as in Barrow (see below) and also between vowels, corresponding to B [X] in this case, e.g. K ayahaaq- and B ayaqhaaq- 'tell string stories'.

Multiple orthographic symbols indicate that the representation of a given sound varies depending on its environment. Outstanding among these is [X], which is written <qh> intervocalically (mayuqhuni 'he, climbing'), <q> preconsonantally in Barrow (mayuqłuna 'I, climbing'), and <h> postconsonantally (saviłhaq 'iron, metal'), although in the latter case some speakers pronounce [h] as the orthography indicates, rather than [X]. Similarly, [x] is <kh> between vowels (siñikhuni 'he, sleeping') and <k> before a consonant in Barrow (akłaq 'brown bear'); post-consonantic [x] is very rare, occurring in qusrkhaaq 'white fox' and the Barrow borrowing pusrkhiq (also, purqiq) 'Negro' from 'Portuguese'. The existence of [x] in this position was apparently unknown to the designers of the orthography.

By not allowing discrete symbols for [X] and [x], the orthography deviates from a strictly phonemic system, which seems justifiable preconsonantally at least, since the k in siksrik 'ground squirrel' and the q in iqsi- 'be afraid' represent fricatives in Barrow, but stops in Kobuk and Seward Peninsula. Once stops were allowed to represent voiceless fricatives in this case, the symbols k and q were carried over to the intervocalic cases, e.g. siñikhuni 'he, sleeping'.

Since Barrow Inupiaq does not allow elements of a consonant cluster to differ in terms of the feature Continuant (see Chapter III), the writing system relies on a convention whereby a symbol normally representing a stop can be used preceding a voiceless continuant to indicate a homorganic voiceless fricative. Orthographic [kł] is thus phonetic [xɬ]. When following a fricative, use of [X] and [h] seem to depend on idiolect. In any case, the orthography uses h for both of these sounds in this position. In some cases postconsonantic [X] is indeed an alternant of q, cf. K uqałhich 'words' from uqałiq 'word' and -ich pl, giving /uqałqich/ by syncope which is followed by progressive assimilation of the cluster.

The other use of multiple orthographic representations for a single phoneme occurs with [č], which is written <ch> in final position (saviich 'knives') and <tch> when long (tikitchuq 'he arrives'); short [č] occurs intervocalically in the Kobuk dialect only (ichuk- 'to tan a skin'). Excepting the Kobuk case just cited, short [č] is analyzable as a palatalized variant of /t/; the designers of the orthography apparently failed to distinguish the contrast which exists between pre-consonantic [č] and [t], however, writing <t> for both phonemes in this position. An attempt has been made to overcome this underdifferentiation within the writing system by the use of <ṭ> for [č] before a consonant and <ch> elsewhere. The use of two symbols for a single phoneme is certainly cum-

bersome; dotting already existing t's, however, has proved the least controversial means of introducing the pre-consonantic t/č contrast into the orthography for those who choose to use it, cf. tikiṭkaa (otherwise tikitkaa) 'arrives at it', but tuqutkaa 'kills it' and the minimal pair iṭqich 'louse nits' vs. itqich 'anuses'.

For our purposes here, the symbol <ṭ> may unfortunately serve to obscure the essential sameness of <ṭ> and <ch>, both of which represent [č]. If this orthographic distinction has any phonetic validity whatever, it lies in a tendency of speakers to release [č] before a vowel or pause, i.e. <ch>, and not to release it before a consonant, i.e. <ṭ>. This "tendency" is by no means uniform, and such a minor phonetic detail does not merit representation in an autonomous phonemic orthography.[2] At points where we feel that the ṭ/ch problem may prove confusing, we will resort to phonetic transcription or point out the difficulty in the course of the discussion. While multiple orthographic representations of the back fricatives appear equally cumbersome, these sounds occur comparatively rarely and do not figure significantly in the data cited here.

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2. The standard orthography should properly represent <ṭ> and <ch> with a single symbol. The use of <ch> for [č] throughout would give spellings like tikichkaa 'arrives at it', which have proved unappealing to those unused to writing pre-consonantic <ch>. Edna MacLean has proposed that short [č] be written everywhere as <ṭ>, with [č:], the present <tch>, written as <ts>, following the Greenlandic system. The phonetic cluster [ts] is non-existent in Alaskan Inupiaq.

The table of consonants above also includes [f], which occurs only adjacent to other voiceless continuants,[3] so that <v> is written and pronounced according to the same convention as that described for stops above, e.g., B tavsi 'belt'. Herein lies another inconsistency of the writing system, since if <k> and <q> represent homorganic voiceless fricatives in this position, the same principle would indicate <p> instead of <v>. In fact Kobuk speakers tend to pronounce a bilabial, rather than a labio-dental, fricative or stop preceding continuants and therefore prefer to write tapsi for 'belt' so that the spelling tavsi is used only in Barrow. Following a voiceless continuant <v> is again written for [f], e.g. B aqvaluq- 'be round'. Here, the convention operates bidirectionally giving [aχfaluq].

The palatal fricative [ç] occurs only in Point Barrow before consonants and is written <s>, since [s] may not occur in this position, e.g. PB savishaq 'iron, metal'. The voiced palatal fricative [j] is found before consonants also and is written <y>, e.g. iñuiyguuq 'the people, it is said...'. The uvular nasal [N] is predictable in dialects where it occurs, viz. Point Barrow, as the allophone of [ʁ] which is found next to a nasal and can

---

3. Rare occurrences of [f] between vowels are found in Alaskan dialects other than Barrow, for example Selawik [vi:f:i:q], the name of a type of grass, and Qawiaraq [qaf:iK] 'wolverine'.

thus be adequately represented by <ġ>, e.g. iġñiq 'son'.

The phonemic principle may also have been sacrificed by the orthography makers for one dialect in cases where it would hamper the adoption of a single writing system for both dialects. In Barrow [ɾ̊] and [ɾ̥] may be considered a single phoneme since they occur in complementary distribution: [ɾ̊] is found between vowels and adjacent to voiced continuants, e.g. iri 'eye', ugruk 'bearded seal'; [ɾ̥] occurs only in clusters with voiceless continuants, e.g. siksrik 'ground squirrel'.[4] In Kobuk, however, both r's may be intervocalic indicating the necessity for separate symbols, e.g. iri 'eye', asriaq 'berry', and thus distinct symbols are used in Barrow as well.

In the representation of Kobuk diphthongs, however, a degree of abstractness which goes beyond the autonomous phonemic level is introduced into the writing system. Due to the merger of some diphthongs with other diphthongs and long vowels, the surface phonetic vowel picture in Kobuk is very different from that of Barrow and might well require an independent system of representation which would greatly affect any exchange of written materials which might otherwise be possible between the two dialects. Kobuk diphthongs are therefore written in an abstract form,

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4. A possible exception is [maɾ̥:uma] 'this one, rel' found in some Barrow speech and written masrruma. Far more common, however, are the equivalent forms marruma and mattuma.

with orthographic distinctions between segments which are phonetically indistinguishable. The representation of Kobuk diphthongs is thus identical to that of their Barrow analogues. In this case writing is based on morphological analyzability of the diphthong or, where impossible, comparison with other dialects. This question is discussed at greater length in Section 4.82.

One unfortunate feature of the Alaskan Inupiaq writing system is its lack of resemblance on several points to other orthographies in use for Eskimo. Any effort to design a pan-Inupiaq writing system will necessarily turn upon the use of the crucial symbol <r>, which represents a voiced uvular fricative in all Inupiaq except Alaskan.

In representing other Eskimo languages, we use a straightforward phonetic transcription, except that <R> is used for [ʁ]. For West Greenlandic, we give transcriptions like those used by Rischel, explaining their value as necessary. In the case of Yupik Eskimo, which has a four vowel system, <e> is written for a vowel which is mid-high central unrounded. Forms are identified as to their dialect by means of the abbreviations listed above. Where no dialect is specified, the form belongs to both Kobuk and Barrow Inupiaq.

Finally, the Inupiaq transcriptions given are to be interpreted according to the phonetic values of individual symbols, where conventions and special considerations

of the orthography do not apply: K qapvik 'wolverine', for example, contains a medial consonant cluster composed of a voiceless labial stop plus a voiced labial fricative, since there is no reason to assume that the written symbols represent anything else.

1.3 Introductory phonology

1.31 Representation of segments by distinctive features

The following matrix lists the surface phonetic segments of Kobuk and Barrow Inupiaq with their distinctive feature values specified. Included are consonants which are not present underlyingly, viz. [ŋ], [ç], and [j], as well as palatals other than [č] whose status depends on the type of analysis chosen, as discussed in Chapter III.

The feature specifications proposed here represent a functional system intended to capture phonological relationships between segments. We thus propose some language specific feature values which reflect function more than the phonetic properties of given segments. Most controversial of these are the nasals which are assumed to be [+continuant] for the reason that nasals may cluster with fricatives but not with stops, consonant clusters being governed by a strict rule of assimilation. The only possible exception which allows a stop to precede a nasal comes in the Kobuk dialect where an intervening segment has been deleted and assimilation is blocked (see 2.31). Nasals may be said to pattern as [-continuant] word finally,

Table 2.

Distinctive feature values of the surface phonetic segments of Kobuk and Barrow Inupiaq.

CONSONANTS

	p	f	v	m	t	n	s	ɬ̥	l	ɾ̥	ɾ̌	č	ç	j	ɲ	ʎ̥	ʎ	y	k	x	ɣ	ŋ	q	χ	ʁ	ɴ̥	h	ʔ
syllabic	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
consonantal	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	+	+	+	+	+	+	+	-	-	-
sonorant	-	-	-	+	-	+	-	+	+	-	-	-	-	-	+	+	+	+	-	-	-	+	-	-	-	+	-	-
continuant	-	+	+	+	-	+	+	+	+	+	+	-	+	+	+	+	+	+	-	+	+	+	-	+	+	+	+	-
nasal	-	-	-	+	-	+	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	+	-	-	-	-	-
lateral								+	+	-	-					+	+											
coronal	-	-	-	-	+	+	+	+	+	+	+	+	+	+	+	+	+	-	-	-	-	-	-	-	-	-	-	-
high	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+	+	+	+	+	+	+	+	-	-	-	-	-	-
back	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+	+	+	+	+	+	-
low	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+
voice	-	-	+	+	-	+	-	-	+	-	+	-	-	+	+	-	+	+	-	-	+	+	-	-	+	+	-	-

VOWELS

	a	i	u	(ɪ)
syllabic	+	+	+	+
consonantal	-	-	-	-
high	-	+	+	-
back	+	-	+	-

however, since only oral stops and nasals are found in this position.

In Chapter II we discuss the derivation of aŋun 'man' from /aŋuti/ where, following apocope, t must be nasalized. Under the system proposed this process requires a change in both the features Continuant and Nasal and suggests that nasals might be better classified as [-continuant]. In some dialects, e.g. Point Barrow, which is really only of secondary concern in this work, final nasalization is trivial in most cases, so that minimal pairs from other dialects which differ only in this respect are non-distinct, for instance, Barrow qimmiñ 'your dog' and qimmich 'dogs' are identical in Point Barrow. It is difficult, therefore, to determine the best specification for nasals in terms of the feature Continuant, since even functional evidence conflicts: nasals pattern with continuants word internally and with stops word finally.[5]

What we refer to below as "palatals" are phonetically alveo-palatals and for this reason are specified as [+coronal]. [s], however, is problematic in that it be-

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5. Underhill (1971) also posits nasals to be continuants; Rischel (1974), however, treats them as [-continuant]. If the feature Continuant is defined in terms of non-blockage of the air flow through the mouth, as in Chomsky and Halle (1968:317), nasals must be considered stops. Nasals may be considered continuants, however, if one's definition of this feature depends on the unblocked flow of air through either the mouth or the nose. While nasals appear to behave both ways in Inupiaq, the feature notation forces us to specify them as either plus or minus continuant.

haves like an alveo-palatal, alternating with [č]. While [s] might thus be considered to be functionally [+high], we do not specify it as such because phonetic justification is lacking (see 3.24).

All Inupiaq dialects have a phonetic three vowel system,[6] although our feature matrix includes, in parentheses, a fourth vowel, schwa, which is often represented as I. While I is not present phonetically, there are strong arguments for its existence underlyingly because of phonological processes which it motivates, as discussed in Chapters III and IV. An abstract phonological analysis of Inupiaq would posit an underlying fourth vowel, and we admit to the possibility of such a solution by giving a feature specification for this vowel. (The fourth vowel is specified in the simplest feasible terms as [-high, -back] so that an additional feature is not added to our vowel matrix.)

1.32 Surface constraints

The vowels of Inupiaq which occur in surface forms -- a, i, and u -- may be short or long. The three vowels are also found paired in all possible combinations giving six vowel clusters, all phonetically long, two of which are monosyllabic and therefore true diphthongs: au [a^w]

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6. The dialect of the Diomede Islands, located in Bering Strait, is exceptional in that it has four phonetic vowels, including schwa.

and ai [a^{y}]. The others, ua, ia, ui and iu are bisyllabic. All six diphthongs are represented orthographically throughout Alaskan Inupiaq although phonetic values vary, and the Kobuk dialect does not have an actual six-way contrast (see 4.82). Long vowels and vowel clusters are in most cases analyzable as sequences of two short vowels. Vowels are predictably lowered and uvularized preceding uvular consonants.

Consonants occur both short and long, except for [f], [s], [ç], [j], [ɣ], [h], and [ʔ] which are never long. The term "geminate" is used most often to indicate the output of the gemination rule, although geminates are phonetically indistinguishable from other long consonants. Consonant clusters contain exactly two consonants and like long consonants are never found word-initially or -finally. Restrictions on what consonants may be found together in clusters are imposed by the assimilation and palatalization processes and are discussed under those headings. In Kobuk, a stop may cluster with a continuant only if the stop precedes. In addition, clusters of a velar and a uvular do not occur in surface forms. Palatal consonants other than [č] follow no vowel except [i] for reasons explained below.

The inventory of consonants found word-initially is very limited as is that of possible final consonants. Occurring initially are [p], [t], [k], [q], [s], [m], and [n] with [y], [l], and [v] found only occasionally and not in all dialects. Interjections, however, commonly violate this constraint, for example, Barrow ñiaq 'don't

do it!' and chatchii 'well done!' or Kobuk valuk 'maybe' and cha 'let's go!'. Exclamations and interjections are often irregular in that they may contain consonants in other than their expected environments. Alakkaa 'alas!' contains a palatal consonant following a vowel other than i. Ii [ĩ:] 'yes' and Barrow hii [hĩ:] 'right here' have nasal vowels, which do not occur in the language otherwise; additionally, hii has an [h] which is not normally found in Barrow, initial [h] being abnormal for any dialect.

Possible word-final consonants are [t], [č], [k], [q], [m], [n], [ñ], and [ŋ]. However, there is no reason a priori to assume that fricatives may not occur morpheme-finally, becoming [-continuant] by a late rule. A stem like mayuq- 'climb', for example, has a final stop in citation form and when a stop follows (e.g. mayuqtuŋa 'I climb'); when a continuant follows, the stem-final consonant is a fricative (e.g. mayuġniqsuq 'he did climb'). Depending on the form of assimilation and other rules, either a fricative or a stop can be taken here as underlying. For Greenlandic, Rischel (1974:373-374) posits morpheme-final consonants which are unspecified for continuancy, with this feature spelled out according to the segment which follows, all word-final consonants becoming [-continuant]. According to the above list of possible final consonants, we posit underlying representations of all consonant-final morphemes with final stops or nasals. In our system, then, as in

citation forms, verb stems may have final [q], [k], [t], [č], or V and singular absolutive nouns final [q], [k], [n], [ñ] or V (see 6.211 for further discussion).

Word-final consonants, especially nasals, are subject to regressive assimilation depending on the initial consonant of the following word, e.g. aġnam piiġaa 'the woman removed it' may be [aRnappi.Ra.], umiam sauniŋi 'boat frame' is often spoken as [umiaɸsauniŋi], and aŋun tautukkaa 'he saw the man' as [aŋuttautukka.].

1.4 Goals of this work

The primary aim of this study is to present and analyze the major phonological processes of the Barrow and Kobuk dialects of Inupiaq, establishing the degree to which these processes are productive synchronically and demonstrating their interaction. In addition, some of the issues at hand are discussed in terms of their historical interest, often with regard to comparative information.

This monograph presents data, and ensuing discussion, for a variety of Eastern Eskimo which has barely been treated in print; West Greenlandic has received the most attention in the literature of any Eskimo dialect. Alaskan Inupiaq represents in many respects a conservative form of Inupiaq which will likely prove interesting to other linguists concerned with Eskimo. We refer throughout to relevant analyses of Greenlandic and draw comparisons where appropriate, since that dialect is sufficiently close phonologically to Alaskan

Inupiaq to permit us to base our work to some extent on the linguistic tradition which has been established for West Greenlandic. The two dialects are still sufficiently divergent, however, to allow the presentation of a large portion of new information as well.

Our analysis employs many of the principles of Transformational Generative Phonology, although that theory is not assumed as basic to this work. One major difference between our approach and that found in Chomsky and Halle (1968) lies in the degree of abstractness considered desirable in underlying representations. It is not assumed that all alternations which can be accounted for in terms of phonological rules should be so handled, and often a somewhat "concrete" approach to problems is suggested. Insights from "concrete" theories, especially Natural Generative Phonology as proposed by Hooper and Vennemann, are brought into the discussion in an effort to consider various possible solutions. We therefore adhere to no particular theory but take rather an eclectic approach, testing the alternatives where interesting. It is by no means a major goal of this work to assess theories; any discussion of this nature which is undertaken stands as secondary to our primary interest of exploring Inupiaq phonology.

The division between abstract synchronic analysis and internal reconstruction of historical processes may sometimes appear vague. Depending on the degree of abstractness one permits in a synchronic analysis, the line between

synchronic and diachronic phonology may be drawn at any one of several points. We thus attempt to evaluate solutions discussed as either synchronically viable, abstract with synchronic motivation, or so abstract as to be of historical value only.

The phonology of younger generations of Inupiaqs has undergone sweeping change and the current idiom contains many competing forms and therefore competing rules or entire rule systems. In this study, we opt for a conservative dialect as the basis of our analysis, making historical and comparative evidence more relevant than it would be to an analysis based on innovative forms and allowing for discussion from a diachronic standpoint. The data presented are "preferred forms" of the older generation; inasmuch as we do not always explain possible competing forms, the dialects treated are "idealized states" of the language. A worthwhile completion of the entire picture for each dialect would involve largely sociolinguistic considerations, especially as concerns the relationship between the rapid linguistic change in progress within Inupiaq and the gradual replacement of the language by English which is occurring by and large. Choosing to treat an "ideal" dialect allows us to concentrate our efforts on the phonological problems we deem important and permits the question of language change to be demoted to a lesser status.

CHAPTER II: Consonant Assimilation

2.1 Introduction

Consonant assimilation is a major phonological process of Inupiaq and grows in scope, generally, as one moves eastward across the Arctic. Thus, in Alaskan Inupiaq there are many more possible clusters than in West Greenlandic, where sweeping assimilatory changes have strictly limited the combinations of consonants. The assimilation processes in these two dialects are related although different in their final effect.

The Barrow and Kobuk dialects have difference in assimilation phenomena as one of their most striking areas of contrast. Assimilation is more complete on the North Slope, which includes Barrow, than anywhere else in Alaska and less so on the Kobuk River. The following examples show Kobuk consonant clusters alongside their more assimilated Barrow cognates.

(1)

Kobuk	Barrow	
qapvik	qavvik	'wolverine'
ikniq	igniq	'fire'
itri	irri	'bitter cold'
utraq	urraq	'fermented walrus hide'
ipnaq	imnaq	'cliff'
mitŋiq-	minŋiq-	'jump'

-tla-	-lla-	'be able to'
-pluni	-vluni	3s sub, real
-pman	-mman	3s consequential, dif subj.

While Kobuk forms may contain adjacent consonants which differ in terms of continuancy and voicing, elements of Barrow consonant clusters must be consistent with respect to these features. In general terms, Barrow cluster consonants may differ only in point of articulation. In most Barrow speech, however, non-nasal back continuants may precede nasals in a cluster, cf. iqniq 'fire', qiñiġman 'when he sees', provided that the two consonants differ in point of articulation. The clusters [ɣŋ] and [ʁN] are thus ruled out.

An interesting transition in terms of assimilation between the North Slope and Kobuk dialects is found in the village of Noatak, as shown by the following forms:

(2)

Kobuk	Noatak	North Slope	
aŋut?mun	aŋun?mun	aŋunmun	'to the man'
qip?miq	qim?miq	qimmiq	'dog'
at?la	al?la	alla	'other'

(Transcription is phonetic for Kobuk and Noatak forms, where the glottal stop does not figure in corresponding standard orthographic representations.)

Stops which precede sonorants in Kobuk are found to be homorganic sonorants in Noatak. The glottal stop found in Kobuk is maintained in Noatak, where the cluster-initial consonant is nevertheless a sonorant as it is on the

North Slope, where no stop quality whatever is present.

2.2 Regressive assimilation in Barrow

2.21 At morpheme boundaries

In Barrow Inupiaq, adjacent consonants agree in features of continuancy, voicing, and (generally) nasality as expressed in the following rule:

Rule 1 Regressive assimilation

$$C \longrightarrow \begin{bmatrix} \alpha \text{ continuant} \\ \beta \text{ voice} \\ \gamma \text{ nasal} \end{bmatrix} \quad / _____ \begin{bmatrix} \alpha \text{ continuant} \\ \beta \text{ voice} \\ \gamma \text{ nasal} \end{bmatrix}.$$

Since this rule nasalizes all consonants which precede nasals, it would yield a uvular nasal in a word such as aġnaq 'woman' and a velar nasal in iŋniq 'fire'. There is dialectal variation on this point. Some North Slope dialects, e.g. Point Barrow and Point Hope, nasalize velars and uvulars before nasals; others, e.g. most of Barrow, keep them as oral continuants, i.e. [ɣ] and [ʁ]. Rule 1 therefore accounts for dialects where assimilation yields back nasals. In these dialects, then, cluster consonants differ only in point of articulation. A variation of this basic rule can be written to exclude back consonants from nasalization by assimilation in appropriate dialects, viz. Barrow.

First, however, we shall further illustrate Barrow assimilation. The process of regressive assimilation

serves to adjust consonant clusters which are created as a result of affixation and which therefore have an internal morpheme boundary. The following Barrow wordforms exemplify assimilation occurring between different morpheme types. Consonants which have undergone assimilation are underlined.

(3) stem to postbase:

aqpat- + -niaq- + -tuq → aqpa<u>nn</u>iaqtuq
'run' fut 3s 'he will run'

Utqiaġvik + -muk- + -tut → Utqiaġvi<u>gm</u>uktut
'Barrow' 'go to' 3p 'they are going to Barrow'

postbase to postbase:

punniq + -tuq- + -niaq- + -tuŋa → punniqtu<u>ġn</u>iaqtuŋa
'bread' 'eat' fut 1s 'I will eat bread'

Utqiaġvik + -muk- + -niaq- + -tuk → Utqiaġvi<u>gm</u>u<u>gn</u>iaq-tuk
'Barrow' 'go to' fut 3d 'they$_2$ will go to Barrow'

stem to inflection:

mayuq- + -li → mayu<u>ġl</u>i
'climb' 3s opt 'may he climb'

katak- + -luni → kata<u>ql</u>uni
'fall' 3s sub unreal 'it falling' unrealized

aqpat- + -luni → aqpa<u>ll</u>uni
'run' 3s sub unreal 'he running' unrealized

word to enclitic:

aqpat- + -tuq + -lu → aqpattu<u>ġl</u>u
'run' 3s 'and' 'and he runs'

aŋuti + -t + -gguuq ⟶ aŋutirguuq[1]
'man' pl rep 'the men, it is said...'

ilvich + -li ⟶ ilvilli[2]
'you$_1$' 'in turn' 'and you, in your turn'

Rule 1, if used to derive the above forms, will not account for the failure of back consonants to become nasalized next to a nasal nor for the fact that t becomes l preceding l and ɣ preceding fricatives. We thus propose a revised version of Rule 1 to account for these additional facts.

Rule 2 Barrow regressive assimilation

$$\begin{bmatrix} C \\ -\text{back} \\ \langle\langle +\text{coronal} \rangle\rangle \end{bmatrix} \rightarrow \begin{bmatrix} \alpha\ \text{continuant} \\ \beta\ \text{voice} \\ \gamma\ \text{nasal} \\ \langle\langle \delta\ \text{lateral} \rangle\rangle \end{bmatrix} / \underline{\qquad} \begin{bmatrix} \alpha\ \text{continuant} \\ \beta\ \text{voice} \\ \gamma\ \text{nasal} \\ \delta\ \text{lateral} \end{bmatrix}$$

While this rule will only ever apply at morpheme boundaries, it is unnecessary to specify a boundary in the rule since no clusters exist elsewhere, viz. morpheme internally, which can undergo it other than vacuously. We have omitted the feature Sonorant from the rule so as not to complicate it further, although it should otherwise be included.

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1. The suffix-initial consonant is shortened by Rule 4, Cluster simplification, discussed in Section 2.31.

2. Palatalization phenomena, as presented in Chapter III, account for the presence of [ʎ:] here.

2.22 Morpheme-internal assimilation

While assimilation across morpheme boundaries holds an important place in the synchronic morphophonology of Inupiaq, regressive assimilation within morphemes is of historical interest. This variety of assimilatory change is not recoverable within the Barrow dialect and cannot be discovered without introducing historical or cross-dialectal information.

Forms in (1) above evidence the assimilated nature of Barrow morpheme-internal clusters in contrast with those of Kobuk, which are more highly differentiated. Rule 2, which accounts for regressive assimilation at morpheme boundaries, will serve also as an historical rule to derive the morpheme-internal consonant clusters of Barrow from their Kobuk cognates, since Kobuk clusters appear to underlie those of Barrow historically.

The Barrow dialect contains many geminate consonants which, under cross-dialectal scrutiny, prove to be reflexes of unassimilated consonant clusters which have undergone the historical version of Rule 2, e.g. B inna and K itna 'thus'. With no morpheme boundary in their immediate environment, these derived geminates show no alternation, and nothing within the Barrow dialect itself provides evidence of their being different in any way from other geminates which are not derived historically from clusters, e.g. mannik 'egg', which is the same in both dialects.

Within Barrow, the assimilated nature of consonants at morpheme boundaries is accounted for by the regressive assimilation rule. In order to capture the same phenomenon morpheme-internally, we may employ a surface structure constraint; otherwise the lack of "unassimilated" clusters morpheme-internally may appear trivial or due to chance. In order to say that such clusters neither occur in the data nor do we expect to find any, Rule 2 should nonetheless prove sufficient. Since it is not restricted to application at boundaries, its vacuous application elsewhere accounts for the lack of unassimilated morpheme-internal clusters, which will have had to undergo the rule leaving no synchronic means of recovery where there is no alternation.

2.3 Regressive assimilation in Kobuk

Barrow morpheme-internal clusters have been interestingly compared with their Kobuk analogues, and an historical process of assimilation has been inferred. To do the same for Kobuk morpheme-internal clusters would necessitate drawing comparisons with another of the Eskimo languages, since Kobuk has the most highly differentiated clusters in Inupiaq. In any event there is no morpheme-internal regressive assimilation in synchronic terms in either of the dialects under consideration, and we will concentrate instead on productive instances of the assimilation phenomenon.

Regressive assimilation of consonants at morpheme boundaries is a fairly generalized process in Kobuk Inupiaq as it is in Barrow, as the following Kobuk forms show:

(4)

aqpaqsruq-	+	-niaq-	+	-tuq →	aqpaqsruġniaqtuq
'run'		fut		3s	'he will run'
savak-	+	-niaq-	+	-tuq →	savaŋniaqtuq
'work'					'he will work'
makit-	+	-niaq-	+	-tuq →	makiŋniaqtuq
'stand up'					'he will stand up'
makit-	+	-luni		→	makilluni
'stand up'		3s sub unreal			'he standing up' unreal
tupiq	+	-ni		→	tupiġni
'house'		loc pl			'in the houses'
Kuuvak	+	-miu		→	Kuuvaŋmiu
'Kobuk River		'inhabitant of'			'inhabitant of the Kobuk'

The Kobuk regressive assimilation process as illustrated above is similar to that of Barrow with one difference: Kobuk assimilation must be restricted to application at morpheme boundaries so that internal clusters as found in the forms of (1), e.g. <u>qapvik</u> 'wolverine', will not undergo the rule. Therefore, we propose a revised version of Rule 1 for Kobuk:

Rule 3 Kobuk regressive assimilation

$$C \rightarrow \begin{bmatrix} \alpha \text{ continuant} \\ \beta \text{ voice} \\ \gamma \text{ nasal} \\ \delta \text{ lateral} \end{bmatrix} \; / ___ + \begin{bmatrix} \alpha \text{ continuant} \\ \beta \text{ voice} \\ \gamma \text{ nasal} \\ \delta \text{ lateral} \end{bmatrix}$$

This rule now also accounts for nasalization of back consonants as found in most Kobuk speech.[3]

2.31 Failure of assimilation before cluster-initial suffixes

In addition to the numerous instances where Rule 3 accounts for regressive assimilation, there exist Kobuk forms where the structural description of this rule appears to be met and yet the rule does not apply; that is, unassimilated clusters are found with an internal morpheme boundary. These cases fall into three categories depending on the type of suffix or stem with which the rule is blocked. Forms below fall into the first category:

(5)

aqpaqsruq-	'run'
aqpaqsruqmaŋaan	'whether he is running'
aqpaqsruqmiuq	'he is running too'
aqpaqsruqman	'when he runs'
savak-	'work'
savakmaŋaan	'whether he is working'
savakmiuq	'he is working too'
savakman	'when he works'

---

3. Jørgen Rischel points out (personal communication) that he would tend to doubt the validity of an assimilation rule with an intervening boundary. Indeed, the need to restrict the Kobuk assimilation rule to operation at morpheme boundaries appears an artifact of the division between synchronic and diachronic phonology. The morpheme-internal clusters which remain in unassimilated form likely do so due to the same circumstances which allow unassimilated clusters to appear at morpheme boundaries (see 2.31 and 2.32). A consonant cluster like that found in qapvik 'wolverine' is possibly CïC underlyingly, and this is certainly true of lexicalizations like iknig 'fire' from iki- 'burn' + -nig stative.

makit-	'stand up'
makitmaŋaan	'whether he stands up'
makitmiuq	'he stands up too'
makitman	'when he stands up'
makitluni[4]	'he, standing up' realized
tupiq	'house'
tupiqni	'in your house'
tikiṭ-	'arrive'
tikiṭlugu	'he arriving there' realized

The suffixes which occur with the above forms are not listed in isolation, since an understanding of the failure of regressive assimilation to apply in these cases depends on the analysis of these morphemes.

Stems whose final consonants fail to undergo assimilation in the above examples have already been found to be subject to assimilation in the forms of (4). Moreover, the suffixes in (4) always trigger assimilation while those in (5) never do. We will therefore look at those morphemes before which assimilation fails to apply in an effort to determine the cause of this failure. The same suffixes found in (4) and (5) are found below in (6) and (7) respectively, now joined to vowel-final stems:

(6)

iga-	'cook'
igaluni	'he cooking' unreal
igalugu	'he cooking it' unreal
ini	'place'
inini	'in the places'
api-	'be snow-covered'
apiniaqtuq	'it will be snow-covered'

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4. For a discussion of assimilation with subordinative verb mood endings, see Section 2.7.

(7)

niġi-	'eat'
niġipmaŋaan	'whether he is eating'
niġipmiuq	'he is eating too'
niġipman	'when he eats'
niġipluni	'he eating' real
niġiplugu	'he eating it' real
iga-	'cook'
igapmaŋaan	'whether he is cooking'
igapmiuq	'he is cooking too'
igapman	'when he cooks'
igapluni	'he cooking' real
igaplugu	'he cooking it' real
nuna	'land'
nunapni	'in your land'

The forms of (6) are as expected with suffixes and endings appearing in the same shapes as in (4). Forms of (7), on the other hand, contain an unanticipated element: a suffix-initial consonant which does not appear in (5). This latter group of suffixes demonstrates a fuller allomorph which appears following vowel-final stems, as in (7), and a reduced allomorph which follows consonant-final stems, as in (5). In their full form, these morphemes may be listed as -pmiuq, -pmaŋaan, -pman, -pluni, -plugu, -pni. In reduced form they lack the initial p.

The distribution of suffix allomorphs may be understood in terms of suffixation patterns. In general terms suffixes are said to be of either the "truncating" or "non-truncating" type, depending on whether they join directly to a stem or cause the deletion of a stem-final consonant.[5]

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5. We adopt the terminology used in Rischel (1974) to describe suffix types.

Both (4) and (5) above illustrate non-truncating suffixes. Examples of truncating suffixes are the following:

(8) B -lla- 'be able' (V-V)
K -tla-

	iga-	'to cook'
B	igalla-	'be able to cook'
K	igatla-	'be able to cook'
	imiq-	'to drink'
B	imilla-	'be able to drink'
K	imitla-	'be able to drink'
	savak-	'to work'
B	savalla-	'be able to work'
K	savatla-	'be able to work'
	makit-	'to stand up'
B	makilla-	'be able to stand up'
K	makitla-	'be able to stand up'

-piaq 'real, genuine' (N-N)

tuttu	'caribou'
tuttupiaq	'real caribou'
aġviq	'whale'
aġvipiaq	'real whale'
iñuk	'person'
iñupiaq	'real person, Eskimo'

These suffixes delete the final consonant of the stem they are joined to, leaving no trace of what was deleted. Non-truncating suffixes, however, retain stem-final consonants, and if they have an initial cluster, would create a three-consonant cluster in violation of a general surface structure constraint of the language, e.g. K katak- 'fall' + -pmiuq 'also does' → *katakpmiuq 'falls also'. A rule of cluster simplification is needed to produce the correct result (katakmiuq) and would apply similarly to forms of

(5). Suffixes which are non-truncating must bear a morphological marking to this effect, since they are otherwise indistinguishable from truncating suffixes.[6]

Rule 4 Cluster simplification

$$C \longrightarrow \emptyset / C__C$$

No morpheme boundary is included in the rule, since three-consonant clusters are not created except by non-truncating suffixation. Rule 4 thus accounts for the reduced allomorph of non-truncating cluster-initial suffixes which appears following consonant-final stems.

Failure of assimilation to apply in the examples of (5) can then be accounted for if regressive assimilation, Rule 3, is ordered before cluster simplification, Rule 4. When a cluster-initial suffix is added to a stem, e.g. katak- + -pmiuq, assimilation will apply vacuously, since in these cases the suffix-initial consonant seems always to be a stop, as is the stem-final consonant. Then the application of cluster simplification, Rule 4, gives the correct result, katakmiuq 'it fell too'.

In the Barrow dialect, the suffixation process also depends on Rule 4, but it interacts with regressive assimilation in no crucial way, making rule ordering unnecessary. Equivalent to the Kobuk ending -pmiuq 'does also' is Barrow -mmiuq. If Rule 4 is ordered following regressive assimilation, we will have /katagmmiuq/ as an intermediate stage

6. See Section 5.4 for a discussion of the probable origin of the truncating/non-truncating distinction in suffixes.

of the derivation followed by cluster simplification to give katagmiuq. With cluster simplification applying first, to give /katakmiuq/, the correct result of B katagmiuq follows by regressive assimilation in any case.

2.32 Failure of assimilation conditioned by syncope

In the first category of exceptions above, lack of assimilation at morpheme boundaries can be attributed to the morphology of the individual suffixes involved, i.e. whether they are cluster-initial and of the non-truncating type. Examples from the second group of exceptions to the process of regressive assimilation would indicate that it is a quality of the stems and not of the suffixes which blocks the assimilation:

(9)

aŋun	'man'
aŋutmun	'to the man'
suppun	'gun'
supputmun	'to the gun'
ini	'place'
inimun	'to the place'
tupiq	'house'
tupiġmun	'to the house'
savik	'knife'
saviŋmun	'to the knife'

In these Kobuk examples, assimilation functions according to Rule 3 as expected, except in the cases of aŋutmun and supputmun. Probably, then, it is forms like aŋun and suppun which block assimilation rather than the terminalis singular noun case ending -mun. Examples of these two nouns followed by other suffixes will illustrate

further:

(10)

aŋun	'man'	suppun	'gun'
aŋutik	'men dual'	supputik	'guns dual'
aŋutit	'men'	supputit	'guns'
aŋutinun	'to the men'	supputinun	'to the guns'
aŋutipiaq	'real man'	supputipiaq	'real gun'
aŋutmun	'to the man'	supputmun	'to the gun'
aŋutnaq	'man's garment'		

Expanded forms of aŋun and suppun appear to be built upon a form ending in ti, with the exceptions aŋutmun, supputmun, and aŋutnaq, since all the suffixes found above may be isolated elsewhere without an initial i vowel. Our present rules will not derive forms like aŋutmun from either the singular noun or the hypothetical stem aŋuti- which seems to be present in the majority of suffixed forms.

If the singular form of nouns ending in n is accepted as their basic form, e.g. /aŋun/, it will be necessary to write a questionable rule of limited application to give the t alternant of n where required. A vowel epenthesis rule will also be needed to account for the i in forms like aŋutik 'men$_2$'.

Alternatively, /aŋuti/ may be taken as the underlying stem of these words, and then forms like aŋutik are easily arrived at. An apocope rule applying to stems is then needed to give aŋutmun, applying also in aŋun along with a final nasalization rule. The vowel deletion is actually part of a larger process of syncope found throughout the language and treated in Section 4.5. In any case syncope must be triggered by a morphological marking on

the suffix, since its motivation is not purely phonological. Final nasalization is a very restricted process which applies to alveolar-final singular nouns only[7] (see also 4.54).

Rule 5 Stem-final nasalization

$$\begin{bmatrix} C \\ +\text{coronal} \\ -\text{continuant} \end{bmatrix} \rightarrow \begin{bmatrix} +\text{nasal} \\ +\text{cont} \end{bmatrix} \; / ____\# \quad \text{in singular nouns.}$$

The latter solution involving apocope appears preferable to that based on consonant-final underlying forms such as aŋun. Vowel deletion is well attested and commonly occurring in Inupiaq, while epenthesis is less so, and we therefore prefer underlying representations such as /aŋuti/, although given the evidence so far, there is certainly no a priori reason to reject insertion of the vowel in aŋutik, etc.[8] In addition, the stem /aŋuti/ appears to hold some degree of psychological reality, since many

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7. Rule 5 is not present in many eastern Inupiaq dialects, cf. WG aŋut 'man'. Further comparison shows that Alaskan dialects have several instances of final nasals not found to the east, e.g. -mun term, -miñ abl, -kun vialis, -tun aeq, -m rel, -iñ/-tin 2s imp, -uŋ 2s-3s imp, and -pman 3s conjunctive dif. subj., as against many eastern dialects which have final stops in these morphemes. Yupik evidence suggests that final nasals must have characterized these morphemes historically.

8. The stem-final vowel in question here is actually I, the fourth vowel, whose status is discussed in Chapter IV. We have chosen at this point not to discuss this additional fact in the text. For a more complete presentation of the epenthesis and syncope solutions, see 4.5 and Rischel (1974:222-228).

younger speakers use it as an alternative form of the singular aŋun.

The situation now begins to resemble closely that of the first category of exceptions, where we found that clusters which fail to undergo the assimilation rule are not in fact simple clusters in underlying representation, but contain an intervening segment. In the first group, this segment was another consonant and part of the suffix; in this case it is an underlying vowel and part of the stem. As has been demonstrated, these intervening segments are not merely ad hoc devices used to block assimilation in desired cases. The full form of morphemes like -pman and the existence of vowel-final stems like /aŋuti/ are motivated even for the Barrow dialect where assimilation creates no problems.

Barrow expansions of n-final nouns, like aŋun and suppun, are identical to their Kobuk cognates, except that in Barrow assimilation is never blocked and is fed by vowel truncation, giving aŋunmun 'to the man', suppunmun 'to the gun', and aŋunnaq 'man's garment'. While the stem /aŋuti/ appears motivated for most Barrow forms based on 'man', e.g. aŋutit pl, it appears that aŋunmun could be most easily derived from the singular noun aŋun. This is only superficially true, for although an underlying representation of the form /aŋun + mun/ provides an easy derivation, suffixes like -mun would have to be specially marked as attaching to the singular noun rather than the stem. Forms inflected

with the plural terminalis case ending -nun, however, would have to be based upon the stem, cf. aŋutinun 'to the men'. To avoid the complication of essentially positing two stems, we accept /aŋuti/ as the basic form in all cases. In innovative speech the allomorph aŋuti is completely replacing aŋun both in the singular and in inflected forms like aŋutimun for aŋunmun 'to the man'.[9] The coexistence of forms like aŋunmun and aŋutinun in conservative speech suggests that syncope has been lexicalized in the singular, since there is no apparent phonological reason why the two should differ in their retention or not of i.

The following sample derivations show how the syncope rule may be crucially ordered so that assimilation is blocked where a surface consonant cluster is an underlying CVC sequence:

supputi + mun	aŋuti + mun	
supputimun	aŋutimun	Regressive assimilation (Rule 3)
supputmun	aŋutmun	Syncope
'to the gun'	'to the man'	

In summary, derivation of the Kobuk form aŋutmun depends on positing underlying /aŋuti + mun/ and allowing assimilation to apply before vowel syncope. The effect of this ordering is to block the application of assimilation in those cases where what is a cluster on the surface is a

9. See Section 4.51 for a discussion of the derivation of aŋun 'man' from /aŋuti/.

sequence of CVC underlyingly. There are certainly many Kobuk clusters whose unassimilated nature is due to syncope, even if we do not derive all such cases synchronically. For example, iknig 'fire' is from iki- 'burn' and -nig nominal, although this word is likely lexicalized, and nipliq- 'make a sound; say something' is from nipi 'sound' + -liq- 'provide'.

2.33 Additional suffixes before which assimilation fails

There exists a third class of exceptions to the regressive assimilation process in Kobuk:

(11)

mayuq-	'climb'
mayuqnak	'don't climb!'
qimak-	'flee'
qimaknak	'don't flee!'
makit-	'stand up'
makitnak	'don't stand up!'
niġi-	'eat'
niġġiñak	'don't eat!'
iga-	'cook'
igganak	'don't cook!'
imiq-	'drink'
imiqnagu	'don't drink it!'
katak-	'drop'
kataknagu	'don't drop it'
niġi-	'eat'
niġġiñagu	'don't eat it!'

The negative imperative endings -nak 2s and -nagu 2s-3s, together with other members of the same paradigm, are consistent in that consonants which immediately precede them fail to undergo assimilation, indicating that some

quality of the endings blocks assimilation, as was the case with the first category of exceptions above.

Nowhere in the Kobuk dialect does an initial segment surface with these endings nor does any other morphological irregularity appear which might account for blockage of the assimilation rule. Interestingly, however, these endings trigger gemination of a medial consonant in vowel-final stems, cf. niġġiñak and niġġiñagu. While a suffix-initial consonant of some sort would explain the failure of the assimilation rule to function before these endings, the deletion of such a consonant can also serve to motivate the gemination process in vowel-final stems (see Chapter VI).

The answer to the problem can be found in King Island Inupiaq where the cognate imperative endings each have two allomorphs, one with an initial stop, i.e. -tnak/-nak 2s neg imp and -tnagu/-nagu 2s-ġs neg imp. Either form of the ending may be used with vowel ending stems producing doublets of which, interestingly, only the forms containing the cluster-initial allomorph of the ending have gemination, e.g. KI niġitnak or niġġinak 'don't eat!' The equivalent imperative endings in Yupik also have an initial stop, cf. SLI -penak 2s neg imp as in mayuXpenak 'don't climb!' or CY -fkenak 2s neg imp as in neRefkenak 'don't eat!' Kobuk assimilation failure and gemination before the imperative endings are seemingly the only remnant within North Alaskan Inupiaq of the initial consonants which these morphemes must have borne in Proto Eskimo.

2.4 Progressive assimilation

In addition to the regressive assimilation processes which have been discussed, Alaskan Inupiaq has a rule of progressive assimilation which applies morpheme-internally under specified conditions. This process is quite restricted in nature and applies only where a morpheme-internal consonant cluster arises as in the following Barrow and Kobuk forms:

(12)

singular	plural	relative	
aiviq	aivġich	aivġum	'walrus'
imiq	imġich	imġum	'water'
maniq	manġich	manġum	'tussock'
kamik	kamŋich	kamŋum	'boot'
ivik	ivgich	ivgum	'grass'
tupiq	tupqich	tupqum	B 'tent', K 'house'

verb stem		nominalized form	
avik-	'divide in two'	avgun	'a border'
ivik-	'wipe'	ivgun	'napkin'
imiq-	'drink'	imġun	'drinking glass'

Progressive assimilation can occur only in morphemes whose underlying form contains a penultimate i which is the reflex of historical schwa. Syncope of this vowel may occur upon suffixation of another morpheme, resulting sometimes in a consonant cluster consisting of a continuant followed by a stop. Since this sequence is forbidden in both Kobuk -- which allows a continuant to follow a stop, but not the reverse -- and Barrow, a rule of assimilation must transform the cluster. In this case the stop is assimilated to the preceding continuant by a rule of

progressive assimilation.

A full discussion of the historical fourth vowel of Inupiaq, schwa, and its synchronic status will be found in Chapter IV. Since the contemporary reality of this vowel motivates the syncope rule -- both here and in stems such as /aŋuti/ -- this problem will be considered here but superficially. At this point it is our concern to emphasize the actual rule of progressive assimilation rather than the complex processes leading to its application.

Rule 6 Progressive assimilation

$$C \longrightarrow \begin{bmatrix} \alpha \text{ continuant} \\ \beta \text{ voice} \\ \gamma \text{ nasal} \end{bmatrix} / \begin{bmatrix} \alpha \text{ continuant} \\ \beta \text{ voice} \\ \gamma \text{ nasal} \end{bmatrix} __ +$$

Rule 6 accounts for complete assimilation according to features of continuancy, voicing, and nasality. Some dialects permit retention of a uvular fricative next to a nasal consonant, i.e. <imġich> 'waters' is equivalent to either [imʁič] or [imNič], and the rule may be adjusted to accommodate this fact. The morpheme boundary found in Rule 6 assures that progressive assimilation will apply only to a morpheme-final cluster and not to a cluster with an internal boundary, since this is the domain of regressive assimilation.

Input to the progressive assimilation process is exclusively the result of the syncope rule, and the two occur in the natural feeding order. For instance, /imiq/

'water' becomes /imq/ by syncope and /imġ/ by progressive assimilation, giving the allomorph found in imġich pl and imġum rel.

2.5 Collapsing the assimilation rules

In order to account for both types of assimilation in Barrow, either progressive assimilation will have to precede regressive or more simply, a morpheme boundary can be introduced into Rule 2 to keep the two processes separate. Basically, then, the direction of assimilation is conditioned by the position of a cluster in relation to a morpheme boundary, i.e. a cluster-internal boundary triggers regressive assimilation whereas a boundary following the cluster causes assimilation to apply progressively.

There is a generality to be extracted from the two assimilation rules which is that in all cases, it is a morpheme-final consonant which assimilates to an adjacent consonant, either preceding or following. Regressive and progressive assimilation can be collapsed into a single rule based upon the above principle.

Rule 7 Assimilation

$$C \rightarrow \begin{bmatrix} \alpha \text{ continuant} \\ \beta \text{ voice} \\ \gamma \text{ nasal} \\ \delta \text{ lateral} \end{bmatrix} / \begin{bmatrix} C \\ \alpha \text{ continuant} \\ \beta \text{ voice} \\ \gamma \text{ nasal} \\ \delta \text{ lateral} \end{bmatrix} / \underline{\quad}+$$

Within the overall context of Inupiaq phonology, this rule appears natural, since morpheme-final consonants undergo deletion and various alternations, whereas morpheme-

initial or internal consonants demonstrate less synchronic alternation. Rule 7 accounts adequately for the Barrow data, since unassimilated clusters never appear in that dialect, and assimilation may be allowed to apply wherever possible. For Kobuk, however, collapsing the two assimilation rules creates an ordering paradox with respect to the syncope rule, since syncope feeds progressive assimilation but must not be allowed to feed regressive assimilation in cases like aŋutmun 'to the man' from /aŋuti + mun/. Single rules of assimilation and syncope do not produce the desired result for Kobuk.

The possibility of writing separate rules of assimilation has been discussed and the problem could be solved in this way. With the order 1) regressive assimilation, 2) syncope, 3) progressive assimilation, the correct solution is arrived at. The sole advantage of dividing Kobuk assimilation thus into two rules would be precisely to resolve the ordering paradox which exists otherwise. Other than their differing environments as regards the morpheme boundary, we can find no evidence that regressive and progressive assimilation should be considered separate processes.

There is evidence, however, that syncope should be divided into distinct rules. From what was historically probably a productive phonological rule, syncope has become morphologized and restricted in its application (see 4.51). The type of syncope which blocks assimilation applies spor-

adically, as demonstrated by aŋutinun 'to the men' rather than *aŋutnun, and numerous forms like inimun 'to the place' where syncope might be expected.

The other function of syncope is to delete penultimate i in stems like aiviq 'walrus' to give aivġich pl, thereby feeding progressive assimilation. This type of syncope occurs regularly.

The distinction between more and less productive variants of the syncope process is valid for Barrow as well as for Kobuk, although in Barrow the two need not be separated in order for Rule 7 to produce the correct result. To generate Kobuk forms, however, the syncope of penultimate i should apply first. Assimilation may then follow in its collapsed version, Rule 7, followed by the rule of morpheme-final syncope. This rule order allows for progressive assimilation in forms like aivġich 'walruses' and regressive assimilation across morpheme boundaries except where a final i is present, having not yet undergone syncope. In this way Rule 7 alone can account for assimilation phenomena in both dialects.

Rule 7, however, actually has a different significance in each dialect. In Barrow the morpheme boundary's only function is to govern the direction in which assimilation applies, since this process is of no importance other than at boundaries. For Kobuk, the + blocks the rule from applying to morpheme-internal clusters such as that in qapvik 'wolverine' besides keeping regressive separate from

progressive assimilation. In a strict sense, then, the two dialects have different assimilation rules whose form coincides.

2.6 Assimilation preceding enclitics

Enclitics may be suffixed to inflected stems, with regressive assimilation applying as expected if a consonant cluster is created. What is interesting in this process is that inflectional endings may contain final consonants not found finally in other morphemes, namely nasals. Therefore, unusual clusters are created which are then subject to assimilation. The following data are from Barrow:

(13)

aġnaq 'woman'	+	-lu 'and'	→	aġnaġlu 'and the woman'
kamik 'boot'	+	-lu 'and'	→	kamiglu 'and the boot'
iñuk 'person'	+	-li 'in turn'	→	iñugli 'and the person, in his turn'
aŋutit 'men'	+	-gguuq rep	→	aŋutirguuq[10] 'the men, it is said...'
iñuich 'people'	+	-gguuq rep	→	iñuiyguuq [iñuijɣuuq] 'the people, it is said...'
ilvich 'you$_1$'	+	-li 'in turn'	→	ilviḷḷi 'and you, in your turn'

There has developed a tendency among Barrow speakers not to apply the assimilation rule to a cluster with an initial nasal which precedes an enclitic, resulting in a normally disallowed sequence of consonants.

10. Rule 4 accounts for simplification of the suffix-initial geminate.

(14)

aŋun 'man'	+	-lu 'and'	⟶	aŋullu or aŋunlu 'and the man'
aŋun 'man'	+	-li 'in turn'	⟶	aŋulli or aŋunli 'and the man, in his turn'
aŋun 'man'	+	-ptauq 'also'	⟶	aŋuttauq or aŋuntauq 'the man also'
aġnam 'woman' rel	+	-ptauq 'also'	⟶	aġnaptauq or aġnamtauq 'the woman also' rel
qiḷaum 'sky' rel	+	-lu 'and'	⟶	qiḷauvlu or qiḷaumlu 'and the sky' rel
miqłiqtuq 'child'	+ -tiŋ poss 3p-3p	+ -lu 'and'	⟶	miqłiqtutiglu or miqłiqtutiŋlu 'and their children'

Nowhere else in the word are surface clusters of a nasal plus a non-uvular oral consonant ever found,[11] even given that nasal-initial clusters are sometimes created by an application of the syncope rule, e.g. tumi 'track' + -li 'make' ⟶ tuvli- 'make tracks' or aŋi- 'be big' + -li 'become' ⟶ aġli- 'grow'. Such forms are rare, however, and can be argued to be synchronically lexicalized.

The Kobuk dialect also permits a nasal to precede a non-nasal when the two are separated by an enclitic boundary, as in aŋunliilaa 'like the man' and taanatuntuuq 'in that way, also'. Additionally, the alveolar stop and its corresponding palatal may be assimilated or not to a following enclitic with an initial continuant. To demonstrate the variation which is possible, we offer the following forms taken from a paragraph of text transcribed

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11. Clusters of a nasal plus a uvular are common, e.g. qaṅġiñ 'your mouth' from /qanĬq + iñ/ by syncope, and aaṅguaq 'amulet'.

from Kobuk speech:[12]

(15) tulukkam asriat + -li → tulukkam asriatli
'raven' rel 'berries' 'but' 'but juniper berries too' (lit. raven's berries)

imiq- + -i- + -plugich + -li → imiġiplugilḷi
'drink' tr sub 3-3p 'but' 'but drinking them'

nani- + it- + -tilaaq- + -ŋich + -lu →
'where' 'be' 'whether' poss 3p 'and'
naniittilaaŋiṭḷu
'and their whereabouts'

At least in Barrow, strict application of the assimilation rule throughout the word appears necessary in conservative speech, while optional application of the rule to nasals before enclitics characterizes innovative dialects. It is significant that the first possible case in which the assimilation rule is relaxed should come at the boundary between the inflected stem and enclitic. This is arguably a stronger boundary than others within the word inasmuch as speakers can identify it, detach individual enclitics and explain their meanings. Boundaries between stem and postbase, and postbase and inflection are much more difficult for speakers to analyze, and with the exception of stems, speakers are not generally able to attribute a meaning to these morphemes.

The substitution of unassimilated aŋunlu for aŋullu 'and the man' preserves the integrity of the basic noun as

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12. Ramoth et al. 1976:4-11.

an individual entity to which the separable enclitic has been added. In the case of aŋunlu it is also certain that the enclitic -lu is added to the singular noun aŋun, whereas other types of suffixes, viz. postbases and inflections, are affixed to the stem /aŋuti/. Another phonological process, namely palatalization, is also applied less strictly from word ending to enclitic than elsewhere, providing additional evidence for the special nature of this boundary (see 3.62).

As to the question of why nasals should be the segments most easily excepted from regressive assimilation, they are among the consonants least likely to serve as input to this rule, since inflectional endings are the only morphemes which may have final nasals. Cases mentioned above such as tuvli- 'make tracks' from tumi 'track' + -li 'make', where a nasal undergoes regressive assimilation following an application of syncope, have been said to be rare and probably lexicalized. Since the vast majority of morpheme-final consonants are obstruents, speakers may be revising the regressive assimilation rule to apply to cluster-initial obstruents rather than to any consonant.

2.7 Assimilation in the subordinative verb mood

Perhaps the oddest synchronic instance of assimilation found in Alaskan Inupiaq occurs with subordinative verbal inflections, which do not follow the assimilation pattern established elsewhere in the language.

3s subordinative, unrealized action

(16)	verb stem	Barrow	Kobuk	
	iga-	igaluni	igaluni	'he cooking'
	mayuq-	mayuġluni*	mayuġuni*	'he climbing'
	savak-	savagluni*	savaguni*	'he working'
	makit-	makilluni*	makilluni	'he standing'

3s subordinative, realized action

(17)				
	iga-	igavluni	igapluni	'he cooking, having cooked'
	mayuq-	mayuqłuni*	mayuqhuni*	'he climbing, having climbed'
	savak-	savakłuni*	savakhuni*[13]	'he working, having worked'
	makit-	makiłłuni*	makitluni	'he standing up, having stood up'

The most easily explained paradigm of the above shows the unrealized action endings for Barrow. The inflection is simply -luni and does not cause truncation of stem-final consonants, which undergo regressive assimilation as expected. The realized Barrow forms, however, are problematic. Igavluni suggests /vluni/ as the basic form of the ending, which is non-truncating. Cluster simplification predictably deletes the suffix-initial consonant following a stem consonant, but the expected result is then *mayuġluni, *savagluni, *makilluni with the application of regressive assimilation; these forms would be identical to corresponding unrealized forms. This syncretism does not occur, however, since clusters in realized forms are in

13. The forms mayuġuni, savaguni, mayuqhuni, and savakhuni which are listed for Kobuk are in fact also possible for most Barrow speakers. None of the forms listed for Barrow only are used in Kobuk, however.

fact voiceless. Historically, we know that the vl cluster of the Barrow ending -vluni is derived from Kobuk pl; the presence of a voiceless element in the original cluster may be responsible in some way for the unexpected devoicing of the cluster in mayuqłuni. Synchronically, however, it is possible to explain the facts in terms of assimilation if we accept /vluni/ as the underlying form of the ending. While the clusters in question are equalized in terms of the feature Continuant by regressive assimilation, their voicelessness indicates that assimilation is progressive. In other words, the back fricatives in mayuqłuni [mayuXłuni] and savakłuni [savaxłuni] as well as the transformation of stem final t to ł in makiłłuni indicate that the continuancy of the suffix liquid has been generalized throughout the cluster. The voicelessness of these clusters, nonetheless, can be said to originate from the stem-final stop. Assimilation in these cases may possibly therefore be considered simultaneously bi-directional. Comparison of the realized and unrealized paradigms, however, brings to light a seemingly better analysis, discussed below.

Kobuk forms are problematic insofar as both realized and unrealized endings show a vowel-initial allomorph following back consonants. If the unrealized ending is -luni as in Barrow, igaluni and makilluni are easily derived. Mayuquni and savaquni, however, are minus the suffix-initial C, whose absence is not easily accounted

for. Similarly, if the realized ending is /pluni/, as in igapluni, the form makitluni follows logically from /makit + pluni/, with regressive assimilation applying vacuously followed by cluster simplification. Mayuqhuni ([mayuXuni]) and savakhuni ([savaxuni]), however, show the absence of the entire suffix-initial pl cluster.[14] These forms, it may be noted, are identical to their unrealized counterparts, except that stem-final consonants have opposing values for the feature Voice.

The expected affixation patterns of the endings in question would produce realized and unrealized forms that are identical in several cases. Deviation from the normal affixation processes seems to bear some relationship to the anticipated syncretism of forms, since the deviation is found only in cases where forms would otherwise become non-distinct with respect to "realizedness."

Forms listed above which are followed by an asterisk are those which would be identical with realized or unrealized endings, given the underlying forms and phonological rules we have proposed. In Barrow, unrealized forms marked with an asterisk occur as expected while the equivalent realized forms deviate from their expected derivations. In Kobuk forms marked with asterisks deviate in both paradigms. This evidence suggests a possible "conspiracy" of the lan-

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14. In Kobuk the suffix-initial l appears only in first person singular forms, e.g. mayuqɣuna 'I climbing' real and mayuġluna 'I climbing' unreal.

guage to maintain distinctness in these forms. Generally, the principle by which this goal is achieved seems to be that where distinctness is threatened, the presence of voiced segments shall characterize unrealized forms and voicelessness, realized forms. With the single exception of B igavluni 'he cooking' real, where distinctness is not in jeopardy, the above statement identifying voicing of the consonants in question with a particular paradigm appears to hold true.

2.8 Assimilatory changes in point of articulation

One final type of consonant assimilation, although only marginal synchronically, bears consideration for Inupiaq: assimilation of consonants according to point of articulation. In the first cases to be considered, a form in one dialect contains a consonant cluster whose elements differ in point of articulation from those of the analogous cluster of a cognate form in a different dialect.

Canadian tuktu 'caribou', for example, is cognate with Alaskan tuttu. Without looking outside Inupiaq, one would be led to attribute the disparity to some sort of assimilation process, assuming tuttu to be derived from tuktu, which has the more highly differentiated consonant cluster. The synchronic rules of Alaskan Inupiaq, however, in no way explain why the cluster kt should undergo assimilation, since it is in violation of no surface structure constraint and occurs commonly throughout the language.

Moreover, Alaskan consonant clusters almost always show greater differentiation than their Canadian cognates.

A diachronic perspective on the problem brings to light forms from other Eskimo languages also meaning 'caribou': SLI tuŋtu and CY tuntu. Like the Canadian tuktu, the SLI form contains a velar as the first element of its internal cluster, while the CY form shows an alveolar as in the Alaskan Inupiaq tuttu. The question at hand then is not one of explaining a simple disparity between Inupiaq forms, but an historical problem of Eskimo, since it is likely that Canadian tuktu is related to SLI tuŋtu and Alaskan Inupiaq tuttu to CY tuntu.

Similar questions arise when one is comparing some Kobuk and Barrow forms, for example, the word for 'heel', K kikmik and B kimmik. In this case the long consonant of the Barrow form is without the velar element found in its Kobuk cognate. The regressive assimilation process would predict *kiŋmik for Barrow, if this form were related in a regular manner to its Kobuk cognate. As in the 'caribou' example, the disparity in the forms meaning 'heel' is not readily explained by synchronic evidence from within Inupiaq.

2.81 The case of 'niqiq'

There is an instance of assimilation of point of articulation in Inupiaq which is to some extent synchronically motivated. When a cluster is created which violates a surface structure constraint on compatible places of ar-

ticulation, the assimilation process is apparently invoked. Velar and uvular consonants are incompatible in this sense and may not be contiguous. Under certain conditions, nevertheless, we anticipate the creation of a cluster composed of a velar and a uvular.

Syncope has been shown to cause deletion of some penultimate i's when a vowel-initial suffix follows, causing a final consonant to cluster with a single medial consonant (VCiC+ → VCC+). If the medial consonant of a given form were a velar and the final consonant a uvular -- or vice versa -- the application of syncope would result in a deviant cluster. Such a form is nigiq 'north, north wind', whose penultimate vowel is the modern reflex of schwa, cf. CY negeq, and can therefore undergo syncope. The relative case form of nigiq is niġġum and the plural is niġġich.[15] The absence of i, that is ĭ, in the second syllable suggests that syncope has applied as expected; strict application of syncope and progressive assimilation to nigiq, however, yields *nigġum rel. There must be another process which adjusts the aberrant cluster to yield a long uvular fricative. We suggest that regressive assimilation takes place to alleviate the incompatibility of the velar and uvular points of articulation along with progressive assimilation of the cluster in terms of the feature Continuant

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15. Comparable forms are also present in West Greenlandic.

as expected.[16]

Our solution is essentially the same as Rischel's (1974:279), who also assumes a bi-directional assimilation process to explain this and similar cases. Anderson (1974: 182), on the other hand, starts with the cluster-final stem /nigq/, our syncopated form, and then assumes metathesis to apply as it does with West Greenlandic continuant-initial clusters to give /niqg/. A rule of velar assimilation then applies progressively to give /niqR/, from which follow forms with a geminate uvular, viz. WG niXXit 'south wind' pl.[17]

Anderson originally posits the velar assimilation rule to explain 1s possessed forms such as West Greenlandic equivalents of AI aġnaġa 'my wife' (from /aġnaq + ga/), argaga 'my hand' (/argak + ga/), and iniga 'my place' (/ini + ga/). The problem of how uvularity is maintained in aġnaġa given the underlying /qg/ seems to puzzle Eskimo linguists eternally. Anderson's solution is to transfer uvularity from the stem-final g to the suffix-initial g by a velar assimilation rule, which seems adequate and certainly no worse than the alternatives. The intervocalic ġ of aġnaġa is then derived by a "geminate simplification"

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16. Some speakers cite nigiġum as the relative case singular form of nigiq. In this instance, syncope has not applied, the creation of a velar/uvular cluster is avoided, and the question of assimilation never arises.

17. Geminate continuants are regularly devoiced in West Greenlandic.

rule. It is not clear, however, where the geminate comes from, since the output of the velar assimilation rule appears to be /aġnaqġa/. This difficulty could presumably be overcome by positing a final fricative in /aġnaq/ which would then yield a geminate by velar assimilation, giving /aġnaġġa/. The application of a geminate simplification rule to this form still appears doubtful, at least given our understanding of this process as described in 5.4. The use of the velar assimilation rule to derive the geminate uvular in WG niXXit appears questionable, furthermore. This analysis is certainly not correct historically, since the same form is present in Alaska where the metathesis rule, on which Anderson's solution depends, is not present. Synchronically, it is not worthwhile to debate the validity of a rule based on its application to a single form.

2.82 Other cases

A similar instance of assimilation according to place of articulation may also be cited, although strictly historical in nature. Three cognate forms all meaning 'mountain' are CY iŋRiq, K iñġiq, and B iġġi.[18] Central

18. Many singular nouns which end in q in Central Yupik and southerly Inupiaq may lack a final consonant in other Inupiaq dialects and especially in Barrow. Besides 'mountain', there are examples such as K katchiq, SP kassiq, B katchi 'wall'; CY qazgiq, I qargi 'men's house'; CY tamluq, SP tabluq, B,K tavlu 'chin'. This variation occurs typically when the last vowel of a noun stem is preceded by a consonant cluster and not by a single intervocalic consonant, since a singular noun of the shape CoVCVq# must undergo gemination in certain inflected forms to give

Yupik permits the clustering of a uvular with a velar. Kobuk Inupiaq has a rule of palatalization of velars (see 3.52), which transforms [ŋ] into [ñ], changing the unacceptable cluster for Inupiaq /ŋʁ/ into the acceptable [ñʁ]. Barrow does not have this palatalization rule, and the only mechanism available for adjusting the cluster is assimilation. As in the case of nigiq, the assimilation is regressive so that the velar changes its place of articulation to uvular.[19]

A potential occurrence of the same phenomenon is found in the case of tikiq 'forefinger; thimble' whose penultimate vowel is also i. Different from nigiq, the medial consonant in this case is a stop. If syncope were to apply, the expected result would be *tekq-, containing a disallowed cluster of velar and uvular. Here, however,

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(18, continued)

C_0VC:Vq#, e.g. nanig/nannich 'lamp' sg and pl, whereas an otherwise similar vowel-final stem will not show gemination in the same instances, e.g. nuna/nunat 'land' sg and pl (see 6.2). Thus a final q plays a role in determining what morphophonemic rules apply to a given stem. A medial consonant cluster or geminate, however, is not affected by gemination, e.g. K katchiq, B katchi/katchich 'wall' sg and pl, so that the presence of a final q in the singular here will change little more than the 1s poss form of the word, e.g. nunaga 'my land' but tikiġa 'my forefinger'. In cases where Inupiaq dialects vary in their use of stem-final q, there is a medial cluster as in the above examples, i.e. not *nunaq for nuna 'land'. Yet, many stems which satisfy the condition of a medial cluster are invariable in their retention of final q, e.g. aġnaq (not *aġna) 'woman', or natchiq (not *natchi) 'seal'.

19. I thank Jeff Leer for calling the 'mountain' example to my attention.

speakers tend to retain the vowel, giving forms such as tikiġiñ 'your forefinger' and tikiġich pl.[20] These are also the accepted West Greenlandic forms, minus the palatalization. In this case the creation of an impermissible cluster is avoided, and so the need for assimilation never arises.

It is not worthwhile to propose a rule of assimilation of point of articulation for a single form. Although nigiq is alone in its category, it is not sufficient to dismiss it as an exception, since no parallel examples which would test the validity of the type of assimilation discussed here are known to exist.

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20. The forms tikkiñ 'your forefinger' and tikkich pl do exist but are apparent analogical restructurings containing internal gemination, which is not normally found in the plurals of stems with penultimate ĭ, as demonstrated in Section 6.211. Otherwise, if these forms are explained through assimilation, we must propose that the process is progressive, rather than regressive as in nigiq. In fact, syncope appears not to apply to stems of the form VCĭC# where the medial consonant is a velar or uvular stop. Thus, atiq 'name' gives atqiñ 'your name', but tikiq 'forefinger' gives tikiġiñ and nukik 'muscle' gives nukiġiñ.

CHAPTER III: Assibilation and Palatalization

3.1 Introduction

The three vowels of Inupiaq -- a, i, u -- stand in sharp contrast to the four-vowel systems of the Yupik branch of Eskimo, which add schwa to the above vowel inventory. There is no doubt that Proto Eskimo had four vowels as do the modern Yupik languages and that the schwa was somehow lost in Inupiaq, having merged with i in most cases. The loss of schwa as a phonetic entity is complete within the dialects we are describing.[1] Traces of the fourth vowel are still present phonologically, however, throughout all of Inupiaq; discovery and discussion of these traces have already been made much of in the literature, especially by linguists working on West Greenlandic (Bergsland, Rischel, and Underhill, among others). In addition, Underhill (1976) has treated this problem in light of the abstract neutralization controversy.

All linguists who have dealt with the structure of Inupiaq, whatever their theoretical orientation, have found synchronic justification for distinguishing between two varieties of [i]. Bergsland (1955:7), in his grammatical outline of West Greenlandic, writes: "As for

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1. Inupiaq dialects of the Seward Peninsula, however, still retain phonetic traces of the schwa. The dialect of the Diomede Islands located in Bering Strait is the only Inupiaq to retain the full four-vowel system.

vowels, it is convenient to split up i into two morphophonemes, i and Ī (in North Alaska probably still phonemes)." He bases his analysis on the deviant phonological behavior of Ī compared to that of the other vowels: "Ī differs from i by not assibilating a following prevocalic t to s and by alternating with zero and with a in cases where the other vowels are invariable...."

It is our intention here to progress well beyond a mere recapitulation of arguments surrounding an old problem. As Bergsland indicates in the above quote, the evidence for dividing up surface i underlyingly is greater in North Alaska than in any other group of dialects. The range of phonological processes depending on such a division is far more important in Kobuk and Barrow than in Greenlandic, over which the vast majority of the discussion has taken place. To our knowledge the Alaskan evidence to which Bergsland refers has never been formally presented. We will present that evidence here, beginning with the closely related processes of palatalization and assibilation.

In Inupiaq where schwa has ceased to exist as a phonetic entity, a new contrast has emerged between palatalized (or assibilated) and plain consonants in North Alaskan dialects, with palatals and derived sibilants occurring only in the environment of [i]. In the following sections, we intend to describe the palatalization process for both the Barrow and Kobuk dialects, to discuss the extent to which

palatal consonants can and ought to be derived by phonological rule, and to present cases which appear exceptional within the system. Generally, we use the term "palatalization" loosely to include the assibilation process, since the two are very closely related and are governed by the presence of the same vowel.

Within Alaska, only North Alaskan Inupiaq and all of North Alaskan Inupiaq has consonant assibilation, with different dialects showing differing degrees of related palatalization processes. Completely devoid of any assibilation or palatalization are the Seward Peninsula dialects, including those of the Bering Strait region. Although assibilation is found in many dialects to the east of Alaska, e.g. West Greenlandic, only the westernmost Canadian dialect, the so-called Mackenzie Delta or Uummannaq dialect spoken mostly at Aklavik, has extensive consonant palatalization. On the basis of palatalization phenomena, then, this dialect belongs with the North Slope group spoken to the west of it in Alaska and appears to be an extension of North Slope Inupiaq dating from the late 1800s and early 1900s, when Alaskans moved east into the Mackenzie Delta area of Canada.

Following modern Inupiaq reflexes of Proto Eskimo *i, there is found a regular correspondence between t in Central Yupik and Seward Peninsula Inupiaq and s (or č) in North Alaskan Inupiaq, including Kobuk and Barrow. The pan-Eskimo word for 'foot' illustrates this relationship:

CY	itgaq
SP	itigaq
AI	isigak

Following reflexes of Proto Eskimo *ə, Central Yupik and Seward Peninsula t correspond to North Alaskan t, as in the word for 'anus':

CY	eteq
SP	itiq
AI	itiq

While the evidence given here is historical in nature, the crux of the assibilation/palatalization problem is essentially how to treat the same consonant alternation which occurs productively within Inupiaq.

3.2 Palatalization in Barrow

Palatalization within the Kobuk dialect is in some ways more complex and less straightforward than that found in Barrow, and for this reason we begin with an account of palatalization in Barrow. The system described for Barrow is basic to North Alaska and thus holds true for Kobuk, although Kobuk contains elaborations on this basic system as will be shown.

3.21 Palatalization following verb stems

The following Barrow data illustrate the occurrence of palatals[2] in suffixes added to vowel-final verb stems. Notice that palatals occur here in alternation with an alveolar consonant; t, l, ɣ, and n all have corresponding

2. "Palatals" include the sibilant s when derived from t. It will be shown that this process functions as part of the language's overall system of palatalization.

palatals. Moreover, palatals are present only after some occurrences of [i]. Suffixes such as -qqayaq 'almost do' (see (22) below) which do not have an initial alveolar show no alternation.

(18) Stems

iga-	'cook'
sisu-	'slide'
tiŋi-	'take flight'
niġi-	'eat'

(19) 3s subordinative mood realized action -vluni[3]

igavluni	'he cooking'
sisuvluni	'he sliding'
tiŋivluni	'it taking flight'
niġivluni	'he eating'

(20) Postbase -lla-'be able'

igalla-	'be able to cook'
sisulla-	'be able to slide'
tiŋilla-	'be able to take flight'
niġillа-	'be able to eat'

(21) Postbase -niaq-future

iganiaq-	'will cook'
sisuniaq-	'will slide'
tiŋiniaq-	'will take flight'
niġiñiaq-	'will eat'

Only niġi- is followed by the palatal alternant of suffix-initial consonants in the above examples.

(22) Postbase -qqayaq-'almost do'

igaqqayaq-	'almost cook'
sisuqqayaq-	'almost slide'
tiŋiqqayaq-	'almost take flight'
niġiqqayaq-	'almost eat'

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3. For the sake of ease in presenting the data, underlying forms assume what we have set out to prove: that alveolars are basic and palatals derived. In this manner, we avoid referring to a given suffix by both surface allomorphs.

The alveolar-palatal alternation observed above may also be found following verb stems with a final consonant, which may be k, q, ţ, or č. Even where the stem-final consonant is not subject to palatalization, a following suffix-initial consonant can still become palatalized.

(23) Stems

isiq-	'enter'
isiq-	'be smoky'
ipik-	'be sharp'
puqik-	'be smart'
makit-	'stand up'
tikiţ-	'arrive'

(24) 3s subordinative mood, unrealized action -luni

isiġluni	'he entering'
isiġluni	'it being smoky'
ipigluni	'it being sharp'
puqigluni	'he being smart'
makilluni	'he standing up'
tikiḷḷuni	'he arriving'

(25) Postbase -niaq-future

isiġniaq-	'will enter'
isiġñiaq-	'will be smoky'
ipigniaq-	'will be sharp'
puqigñiaq-	'will be smart'
makinniaq-	'will stand up'
tikiññiaq-	'will arrive'

(26) 3s intransitive verb inflection -tuq

isiqtuq	'enters'
isiqsuq	'is smoky'
ipiktuq	'is sharp'
puqiksuq	'is smart'
makittuq	'stands up'
tikitchuq	'arrives'

Palatal variants of suffix-initial alveolars in these preceding cases are found only with the stems isiq- 'be smoky', puqik-, and tikiţ-.

3.22 Palatalization following noun stems

Noun stems may end in a vowel, k, or g. As with verb stems, a following suffix with an initial alveolar will have palatal alternants after some occurrences of i but not others.

(27) Stems

iglu	'house'
iki	'wound'
ini	'place'
savik	'knife'
kamik	'boot'
qimmiq	'dog'
aiviq	'walrus'

(28) Enclitic -lu 'and'

iglulu	'and a house'
ikilu	'and a wound'
inilu	'and a place'
savigḷu	'and a knife'
kamiglu	'and a boot'
qimmiġḷu	'and a dog'
aiviġlu	'and a walrus'

(29) Plural modalis case ending -nik (causes truncation of some stem-final consonants but not others, see 6.21)

iglunik	'houses'
ikiñik	'wounds'
ininik	'places'
savigñik	'knives'
kamignik	'boots'
qimmiñik	'dogs'
aiviġnik	'walruses'

(30) Singular aequalis case ending -tun (also causes truncation of only some stem consonants)

iglutun	'like a house'
ikisun	'like a wound'
initun	'like a place'
saviksun	'like a knife'
kamiktun	'like a boot'
qimmisun	'like a dog'
aiviqtun	'like a walrus'

These suffixes exhibit their palatal alternants after iki, savik, and qimmiq but not after iglu, ini, kamik, and aiviq.

3.23 A synchronic approach to palatalization

Above is found a complete account of palatalization phenomena following stems. Only if the last vowel of a stem is [i] may the palatalized variant of a suffix-initial consonant follow. A preceding [i] is thus necessary but not sufficient for palatalization. As a consistent pattern, any stem which is followed by palatals may not be followed by alveolars and vice versa. The same may be said of suffixes, which behave like stems in this respect.

There is no way to predict which instances of [i] will trigger palatalization and which will not, short of looking at other processes which depend on the distinction between two i's or else examining data from other Eskimo languages. Instances of i associated with palatalization in Inupiaq are typically cognate with [i] in Yupik languages. Inupiaq i which may not be followed by palatals is cognate with Yupik [ə]. Thus, the St. Lawrence Island equivalents of the Barrow stems qimmiq 'dog' and kamik 'boot', only the first of which was found to trigger palatalization, turn out to be qikmiq and kamek respectively.

Cross-linguistic cognates are often revealing, but correspondences are not always as expected. Whereas B niġi- 'eat' does trigger palatalization (cf. niġilla- 'be able to eat'), its Central Yupik cognate is neRe-, although

the Barrow form leads us to expect *neRi-. The Inupiaq vowel system thus does not always match in a simple or obvious way that of related languages or of Proto Eskimo.[4]

The data given above which illustrate palatalization phenomena in the Barrow dialect are intended to demonstrate the claim that a synchronic phonological process of Inupiaq may make reference to information which is not present at the surface phonetic level. Palatalization indicates the division of [i] into two segments underlyingly, and vowel alternation evidence, which has yet to be presented (see Chapter IV), further corroborates this division. At this point it is convenient to introduce a special symbol to distinguish the two types of i. In keeping with this tradition, we will use i for what is historically *i and ɪ for the reflex of *ə. In order to facilitate discussion, we thus assume an analysis which permits this distinction to be made, although we do not say here what the distinction represents in terms of phonological content. After the complete range of processes which depend upon the two i's has been presented, we will discuss the question of whether ɪ can be said to have any status as an underlying segment and if not, how else the alternations which are otherwise determined by the i/ɪ contrast can be handled.

4. In a recent article (Kaplan, 1981), we discuss exactly this question of verb stem final vowels which fail to correspond as expected to their Yupik cognates. In brief, Inupiaq seems to have innovated a palatalizing type i in many cases where Yupik shows a schwa, as is the case with Inupiaq nɪRi-, which triggers palatalization, as against Yupik neRe-.

3.24 The palatalization rule

A basic rule may be written to palatalize alveolars if we assume that I will somehow fail to trigger the rule, either because of its feature specification, a special diacritic, or some other device. It is not sufficient to characterize those segments which may undergo the rule simply as coronals, since s, sr, and r are coronals which may not become palatalized. Thus we specify the input to the palatalization process as coronals which, if continuants, are also sonorants. t is subject to palatalization and as a non-continuant may also undergo Rule 8.

Rule 8 Palatalization of alveolars

$$\begin{bmatrix} C \\ +\text{coronal} \\ \alpha\text{ continuant} \\ \alpha\text{ sonorant} \end{bmatrix} \longrightarrow [+\text{high}] \;/\; \begin{bmatrix} V \\ +\text{high} \\ -\text{back} \end{bmatrix} \; (C) ____$$

Rule 8 contains an optional C which allows the second element of a cluster following /i/ to become palatalized as in niġivluni 'he eating'. If both elements of a cluster are alveolars, both are palatalized. Chomsky and Halle's (1968) principle of Simultaneous Rule Application allows the rule to apply in expanded and unexpanded form simultaneously. Therefore, Rule 8 accounts for palatalization in four cases: A) iCV → $iC^{y}V$, B) iCC → $iC^{y}C$, C) iCC → iCC^{y}, and D) iCC → $iC^{y}C^{y}$.

Not accounted for by Rule 8 is the prevocalic variant of [č], which is [s] as in (26) puqiksuq 'is smart' and (30) ikisun 'like a wound. This variation can be

accounted for by a lower level rule:

Rule 9 Assibilation

č → s / ____V

Since the input of Rule 9 is a short affricate, it will not affect [č:], as in (26) tikitchug 'he arrives.'

This rule gives cause to wonder whether all Barrow [č] and [s] might not be related by rule. In fact the two are in complementary distribution and an autonomous phonemic analysis of the language might well posit one phoneme for both [č] and [s] with the following distributional statements: [s] but not [č] occurs morpheme-initially; [č] but not [s] occurs morpheme-finally; only [č] may be long, and only [s] may be cluster-final or intervocalic (i.e., only [s] may be prevocalic as determined by Rule 9). While "economical" such a solution has its disadvantages for our purposes. If /s/ were posited as the underlying segment, it would then occur as an intermediate stage in the palatalization of /t/ to [č], e.g. /qimmit/ → /qimmis/ → qimmich 'dogs' where the final C would change values twice for the feature continuant. Basic /č/ would avoid this difficulty, but would have to underlie initial [s] in all cases, e.g. /čavik/ for savik 'knife', whereas short [č] functions otherwise only as the palatal alternant of /t/. In our analysis some [s] is derived from [č] by Rule 9, but we otherwise posit non-alternating instances of [s] underlyingly in their surface form.[5]

5. The Fish River dialect of Qawiaraq Inupiaq actually has [č] for other Inupiaq [s] in all positions.

3.25 Non-alternating palatals

The instances of palatalization presented so far all occur immediately following a morpheme boundary or else as part of a cluster preceded by a morpheme boundary. In these environments, the palatalization process may be considered productive, since there will be alternation with plain consonants when a vowel other than /i/ precedes the morpheme in question.

Besides the examples of productive palatalization we have presented, there are many instances of palatal consonants in the language which show no alternation with alveolars. In order to discuss these cases, we will systematically categorize the environments in which palatalization occurs in an effort to determine where it may be accounted for by rule and in which cases i should be broken down underlyingly into /i/ and /ĭ/.

3.251 i preceding non-coronals

In many morphemes containing i, no palatalization or alternation of any sort is present, and thus there is no indication as to the "underlying status" of i. Imu- 'to roll up' and ipu 'handle' belong to this category. Since their initial vowels are indeterminate, there is no cause to believe that these forms should be represented underlyingly in a form which does not match their surface representation; therefore, imu- and ipu are said to contain /i/ at all levels.

3.252 Accounting for non-alternating palatals

Within some morphemes, the underlying nature of i is "revealed" by a following consonant, a palatal or an alveolar. For instance, we can tell that the initial vowel of ini 'place' is at some level /Ī/, whereas that of iñuk 'person' is /i/. Where no consonant alternation is present after a given i, as in these cases, the question must be raised as to whether there can be sufficient justification for positing i in its abstract representation and deriving palatalization by rule. It can be argued that non-productive occurrences of palatalization are of no concern to a synchronic grammar and that in such cases palatals should figure in underlying forms.

Crucial to a discussion of this problem is the generality that palatal consonants, with the exception of [č:] and [s], occur only in the environment of i.[6] This distribution holds true morpheme-internally as well as at morpheme boundaries. The following are examples of non-alternating palatals which belong to the same morpheme as the preceding i:

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6. One exception where a palatal consonant is found without the usual preceding /i/ is aññaq 'female cousin'. Aññaq occurs only in palatalizing dialects, i.e., no Alaskan dialect has *annaq, and may be a shortened form of annaqataq which occurs in lower Malemiut with the same meaning. Otherwise, interjections also violate the expected environment for palatals, as discussed in Section 1.32.

(31)

ili-	'put, place'
iñi-	'hang up to dry'
sili-	'sharpen'
siñik-	'sleep'
silu	'carcass drifted ashore'
siñi	'edge, shore'

Plain consonants, of course, occur following any (phonetic) vowel. To posit palatal consonants underlyingly alongside plain ones would be to equate the two and miss the generalization of the former's restricted occurrence after i. The consonant s, however, appears to function both as an alternant of t and as an underlying segment without the defective distribution of palatal consonants:

(32)

asiaq	'berry'
pasi-	'to blame'
nusaq	'hair'
isiq	'smoke'

In the above forms there is no restriction on the vowel which may precede s. In other cases, s is found to alternate with t after /i/, clearly the result of the palatalization and assibilation processes (Rules 8 and 9):

(33)

mayuq-	+	-tuq	⟶	mayuqtuq	
'climb'		3s		'climbs'	
puqik-	+	-tuq	⟶	puqiksuq	
'be smart'		3s		'is smart'	
mayuq-	+	-tit-	+	-kaa ⟶	mayuqtitkaa
'climb'		'do with, for'		3s-3s	'climbs with him, it'
aqik-	+	-tit-	+	-kaa ⟶	aqiksitkaa
'rub'					'rubs with it'

When s follows i and shows no alternation, i.e. when s and a preceding i belong to the same morpheme, there

is no synchronic means for distinguishing between s which is palatalized t and s which is not. For example, sisamat 'four' is cognate with SP sitamat, and so we know that, at least historically, assibilation has occurred. Isiq 'smoke', however, is SP iziq which tells us that the sibilant here is not derived at any level. This information is of strictly historical interest, since the second s of sisamat and that of isiq are synchronically indistinguishable within North Alaskan Inupiaq. Since s must be assumed to be underlying anyway in forms like asiaq, non-alternating instances of s need not be represented underlyingly by anything but s.

Similarly, č may result from palatalization (tikitchuq 'arrives' from tikit- 'arrive' + -tuq 3s) or may not (natchiq 'seal'). Where no alternation is present, as in natchiq, č must be underlying.

The other palatal consonants, ñ, ʎ, and ʝ, are found only preceded by i whether or not they alternate with alveolars. It seems confusing to attribute these consonants also to two sources, underlying and derived by palatalization, since they may not be underlying in the sense described for s.

3.3 Restrictions on the occurrence of i

3.31 Adjacent vowels

The underlying form of surface i, i.e. /Ī/ or /i/, can be determined if a coronal consonant follows, as shown

above. Alveolars are preceded only by /ĭ/ and palatals only by /i/. In addition, ĭ generally never clusters with another vowel without undergoing alternation (see Chapter IV), as in aŋutau- 'to be a man' from aŋuti- 'man' + -u- copular. As the second element of a vowel cluster, i is demonstrably /i/, since it may be followed by palatal consonants, cf. uiñiktuq 'gets a husband' and aiñiqsuq 'went home'. The few instances where i may precede another vowel are discussed in Section 4.21.

3.32 Consonants which may precede i

The distribution of the two i's is further restricted within the language, often in relation to a preceding consonant. A stem-initial alveolar consonant -- only n or t -- may be followed by /ĭ/ but never /i/:

(34)

niglaq-	'cool off'
niliq	'a fart'
nipi	'voice, sound' (cf. nivliqsuq 'makes a sound'
niqi	'meat, food' (cf. niqłiqsuq 'prepares food'
tilak-	'wipe clean'
tili-	'to order, command'
tiluk-	'knock snow off something'
tinniq-	'to touch'
tinu-	'push'
tipi	'odor' (cf. tivliqsuq 'is smelly')

Following initial s is found /i/ but never /ĭ/, so that #si may be followed by a palatal but not an alveolar consonant:

(35)

siġluaq	'ice cellar'
sikłaq	'pickaxe'

sili-	'sharpen'
silivla-	'overflow'
siñik-	'sleep'
sisi	'burrow, den' (cf. SP siti)
sisamat	'four' (cf. SP sitamat)
siṭquq	'knee'

These forms lead us to believe that initial sequences such as #tiḷ, #niñ, #sin, and #sil are all impossible for Inupiaq; certainly none have been found.

Within the word, vowel distribution is somewhat different. Excepting t and s, alveolar and palatal consonants may be followed by either type of i: naniq 'lamp' (cf. nannich pl) contains /i/ following an alveolar, while siñik- 'to sleep' (cf. siñiktuq 'sleeps') contains /ĭ/ following a palatal. t, however, is followed only by /ĭ/ anywhere within the word:

(36)

atĭq	'a name'
itĭq	'anus'
mitĭq	'eider duck'
patĭq	'marrow'
qatĭq-	'be white'
tatĭ-	'brush against'
titĭq-	'to mark'
utĭ-	'separate fur from hide'

These forms can all be shown to contain /ĭ/ following t.

The type of i which follows s depends on the source of s. Underlying (historical) s is followed by /i/:

(37)

asiq	'sleeve'
isiqsuq	'it is smoky'
masik	'fish gill'
pasi-	'to blame'
qisik	'leather'
tasitchuq	'it stretches'

Where s is derived from t by palatalization, s may

be followed by /ï/ but never /i/:

(38)

akisït	'pillows' (cf. SP akitit)
isïk	'caribou toe skin' (cf. itkich pl.)
isïqtuq	'enters' (cf. SP itiqtuq)
pisïk-	'shoot' (cf. SP pitik-)
sisït	'burrows, dens' (cf. SP sitit)

In all of the above cases, the underlying form of i is predictable from its environment. Thus redundancy limits the number of instances in which /ï/ and /i/ would have to be distinguished underlyingly if an abstract approach is accepted and non-alternating palatals are derived by rule.

The reason for the existence of the limited distributions of /ï/ and /i/ described here is all but clear in synchronic terms. There is certainly, however, a relationship to the process of regressive palatalization (see 3.7) by which /i/ causes assibilation of a preceding t to s and tt to tch, effectively barring the sequence ti (i = /i/) from surface forms. In Section 3.8, we refer to a similar process in Central Yupik which may have been the original germ based upon which Inupiaq developed its innovative palatalization system. Perhaps prohibition of the ti sequence became extended in initial syllables to exclude all sequences of alveolar plus /i/ and conversely sibilant plus /ï/. Such sequences are acceptable in other Eskimo languages. Inupiaq has no additional constraints on the co-occurrence of /i/ and /ï/ in adjacent syllables, i.e. of the form VCV.

3.4 Alternation among palatals

Some palatal consonants exhibit alternation with other palatals and never alveolars, since the alternation takes place within a single morpheme:

(39)

	akiñ	'pillow'
	akisit	pl
B	akiñmun	'to the pillow'
K	akiṭmun	'to the pillow'
	isiq-	'enter'
	iṭqun	'entry'
	iṭqutigaa	'brings it in'
	isik	'caribou toe skin'
	iṭkich	pl
	sisi	'burrow, den'
K	siñ	alternative form of singular
	sisimi	locative
K	siṭmi	alternative form of locative

In these examples, s occurs as expected between vowels, ñ occurs finally by Rule 5, and t (i.e. [č]) or ñ occurs before consonants depending on whether assimilation applies. In all of the above forms, the palatal consonant in question is followed by /ĭ/. The syncope rule discussed in Chapters II and IV operates upon these forms, changing the environment of the palatal consonant and necessitating alternation according to the consonant assimilation rule and Rule 9, which accounts for s/č alternation.

These forms pose particular problems if one's goal is to account for the alternations they show by means of underlying representations and a set of rules. Since no

alveolar-palatal alternation is present, some would question whether palatals should be derived here. In any case a single basic segment must be posited underlyingly so that palatal alternants can be accounted for.

An abstract solution would allow palatalization to be derived in these cases, which makes the form akiñ comparable to aŋun 'man', as discussed in 2.312. Underlying /akitĭ/ is subject to apocope, palatalization, and final nasalization to give akiñ. Palatalization will give [č] before a consonant as in K akiŧmun where assimilation is blocked. Rule 9 gives s intervocalically as in akisit. The forms meaning 'enter' and 'caribou toe skin' will then be posited as underlying /itĭq/ and /itĭk/ respectively, with the palatalization rule and Rule 9 accounting for the s/č alternation.

The crux of this problem is that the stop alternant must be taken as basic, since an already existing rule accounts for the s variant between vowels. In a concrete solution which must posit underlying palatalization in these cases, it is not clear which allophone could be taken as basic so that the others could be derived from it. If the stop were underlying, giving /akiči/, this form would appear "unnatural" in terms of possible surface allomorphs, since in none of the allomorphs is č intervocalic. If s were underlying (/akisi/), the reverse of Rule 9 would be needed to account for the loss of continuancy of this s in

forms containing č. Normally, Inupiaq stops may become continuants between vowels but not vice versa.

Only a small number of problem cases like akiñ will be found in any event, and one may want to argue for lexicalization in these instances. The majority of forms which exhibit alternation among palatals are the result of productive suffixation and palatalization processes:

(40)

sali-	'to cut'
salliñ	'cutting instrument'
sallisik	'scissors' (dual form of salliñ)
niġi-	'to eat'
niġġiñ	'eating utensil'
niġġisit	plural
iga-	'to cook'
iggan	'cooking utensil'
iggatit	plural

Salliñ and niġġiñ result from the addition of the same instrumental suffix as is found in iggan (see 6.214); the presence of stem-final /i/ in the former cases causes palatalization of the suffix. Accounting for these productive alternations presents no problem for any analysis that recognizes two types of i. Cases like akiñ, however, are not segmentable into separate morphemes, and it is here that difficulties occur in selecting an adequate underlying representation if morpheme-internal palatalization is not to be derived by rule.

3.5 Palatalization in Kobuk

The palatalization of alveolar consonants after /i/ as described for Barrow is also found in Kobuk. An even

greater range of palatalization phenomena is found in Kobuk, however, than in Barrow or any other Inupiaq dialect.

3.51 The s/sr alternation

As demonstrated for Barrow, s in the Kobuk dialect may be derived from t, e.g. puqiksuq 'is smart' from puqik- + -tuq. s also occurs in Kobuk as an alternant of /ʂ/, i.e. <sr>, found after /i/ as shown by the postbase -sruk (V-V) meaning 'want':

(41)

igasruk-	'want to cook'
tiŋisruk-	'want to take flight'
niġisuk-	'want to eat'
tiŋmisuk-	'want to fly'

Morpheme-internally as well, s follows /i/ while sr is found after other vowels:

(42)

asriaq	'berry'
masru	'Eskimo potato'
kusrulugaq	'icicle'
pisruk-	'walk'

but,

sisamat	'four'
qisik	'leather'
isigak	'foot'
kisiṭ-	'count'

Barrow s, remember, is present either underlyingly or as a result of assibilation (Rule 9). Non-initial Kobuk s can only be derived, although not always productively, never occurring after vowels other than /i/. Initially, sr does not occur in any dialect and s is found in Kobuk just as in Barrow, e.g. savik 'knife', siku 'ice'.

As was the case for the alveolar-palatal alternation, it is not clear exactly which instances of Kobuk s

are to be derived by rule. Where there exists alternation, sr certainly underlies its palatal alternant s. However, where there is no alternation, s still occurs only initially and in the environment of /i/.

3.52 Velar-palatal alternations

In the Kobuk dialect, velar consonants are sometimes found to have palatal alternants after /i/. These alternations are most often not productive and can only be discovered by cross-dialectal comparison, indicating that these cases are lexicalized within this dialect. Kobuk forms illustrating these alternations are given below with their Barrow cognates:

		Barrow	Kobuk	
(43)	k/č:	ikuk-	ichuk-	'scrape a skin'
		ikuun	ichuun	'skin scraper'
		ikka	itcha	'over there'
		ikani	ichani	'located over there'
		pikka	pitcha	'up there'
		pikani	pichani	'located up there'
		qikaq-	qichaq-	B 'loiter', K 'stand'
		niġipkaġaa	niġipchaġaa	'feeds him'
		tikiṭkaa	tikitchaa	'arrives there'
(44)	g/y:[7]	iggaġriq	iyyaġriq	'black bear'
		sigguuk	siyyuuk	'beak, bill'
		niġigaa	niġiyaa	'eats it'
		kuvigaa	kuviyaa	'spills it out'
	but,	igagaa	igagaa	'cooks it'

7. The g/y alternation is also found in Anaktuvuk Pass and in southern Malemiut within stems only. These two dialects have none of the other velar-palatal alternations.

(45)	ŋ/ñ:	piŋasut	piñasrut	'three'
		miŋuk-	miñuk-	'to color, mark'
		aviŋŋaq	aviññaq	'lemming'
		kiŋuniq	kiñuniq	B 'ancestor', K 'home'

The one velar consonant which has no palatal equivalent is [x], i.e. <kh>, which keeps the same form following /i/ as after other vowels:[8]

(46)	ipīk-	'be sharp'
	ipikhuni	'it being sharp'
	agik-	'rub'
	agikhuni	'he rubbing'

Velar-palatal alternations are much less regular and productive than their alveolar-palatal counterparts, which function almost without exception. Before discussing how to treat the palatalization of velars, it will be fruitful to present cases where this process fails to apply, that is, where velars -- k, g, ŋ -- are found after /i/.

As discussed above, we have found no case where /ī/ occurs demonstrably following initial s. And yet in the Kobuk dialect, k and ŋ are never palatalized following #si- (g, however, does palatalize here as shown above):

(47)	siku	'ice'	siŋiq	'boot lace'
	sikit-	'bow the head'	siŋiġñiq	'ankle'
	sikkutaq	'sty on the eye'		
	sikłaq	'pickaxe'		
	siqña-	'be stingy, greedy'		

The palatals in sikłaq and sikña- show in fact that /i/ is present, and yet k is found in unpalatalized form. At a

8. We have no examples of [x] morpheme-internally.

morpheme boundary, k almost never palatalizes after /i/:

(48) agikkaa 'rubs it'
puqikkaluaqtuq 'although he is smart'
savvika 'my knives$_2$'

At morpheme boundaries ŋ too fails to palatalize as expected:

(49) uiŋa 'her husband' (from ui 'husband' + -ŋa 3s poss)
ipnaiŋuruq 'is a sheep' (from ipnaiq 'sheep' + -ŋu cop + -tuq 3s)

Because of the many irregularities present, it will not be possible to characterize the palatalization of velar consonants as a phonological process statable by rule. However, some generalities may be drawn from the above data, which, we believe, may indicate a functional explanation for the existence of palatalization.

There is rarely actual alternation between velars and palatals within the Kobuk dialect because velars palatalize only sporadically at morpheme boundaries. This process is productive in the following cases:

(50) A) -pkaq/-pchaq causative (following vowel-final stems)

igapkaġaa 'makes him cook'
niġipchaġaa 'makes him eat, feeds him'

B) -kaa/-chaa 3s-3s transitive (following consonant-final stems)

tuqutkaa 'kills it'
tikitchaa 'arrives there'

C) -gaa/-yaa 3s-3s transitive (following vowel-final stems)

igagaa 'cooks it'
niġiyaa 'eats it'

(Velar-palatal alternation is found throughout the transitive indicative paradigm, e.g. niġiyiga 'I eat it'.)

Since B and C above represent allomorphs of the same verbal inflection, the evidence for palatalization of velars as a productive process is slim indeed. These two suffixes have to be specially marked as having special alternants found following /i/, since their existence does not justify a separate rule of palatalization of velars.

3.53 The "function" of palatalized velars

The great majority of palatals derived from velars are found within the word stem and exhibit no alternation. It is nevertheless true that velars sometimes fail to palatalize stem-internally, as described above. Where the palatalization fails, it happens following initial si which is precisely the environment where i has been found to be predictably /i/.

In terms of a functional explanation, the evolution of palatalization may be seen as related to the reduction of four vowels to three which occurred in Inupiaq. The Yupik languages all maintain the original Eskimo four-vowel system and show no palatalization. The Seward Peninsula dialects of Inupiaq which to this day retain traces of the archaic schwa as a phonetic entity -- Diomede retains the complete four-vowel system -- have no palatalization. Only where the fourth vowel has merged completely with /i/ is

palatalization found.

As a contrast was lost in the vowel system, it is possible that a new contrast was created among consonants as a compensatory device based on the former vowel system. Palatalization, in effect, may have helped to maintain a distinction which was otherwise being lost.

The palatalization of velars in the Kobuk dialect represents a step beyond the palatalization of alveolars found throughout northern Alaska toward preserving the distinctness which was lost through simplification of the vowel system. That this may be the essential "function" of consonant palatalization is suggested by the fact that velars (k and ŋ) fail to palatalize when they are preceded by an i which is predictably /i/, i.e. that occurs following initial s.

Velar palatalization fails to occur following morpheme boundaries, except in two cases noted above. Morpheme-final i's are frequently followed by suffixes exhibiting the productive alveolar-palatal alternation. Palatalized velars will thus never be the sole means of "identifying" a morpheme-final i as it often is morpheme-internally.

The overall effect of allowing velars to become palatalized is one of significantly reducing the occurrences of i which are opaque as to their (historical) underlying form. As discussed in Section 4.82, Kobuk has experienced a loss of distinctness among certain diphthongs beyond the

loss of the fourth vowel which took place throughout Inupiaq. It is interesting that the dialect with the least distinctness among vowels of any in Alaska should have the most elaborate palatalization system, which can be said to reflect in many ways the former vowel system. As said before, Seward Peninsula dialects, which retain traces phonetically of the archaic system -- and whose diphthongs are distinct -- have no palatalization.

The comments offered here are only speculative in nature and do not account for the fact that only rare suffix-initial velars are palatalized rather than all or none. Palatalization of velars in Kobuk may at one time have been a far more general process which is today found only in lexicalized morpheme-internal instances as well as with a small number of very common suffixes.

3.6 Irregularities within the palatalization system

In preceding sections we have found palatalization of alveolars to be nearly exceptionless, while palatalization of velars has proved highly irregular. Here we will discuss cases where the environment necessary for alveolar palatalization appears to be satisfied and yet the process does not apply. These cases all result from joining morphemes in manners other than the usual suffixation and for this reason they are grouped in the same category.

3.61 Demonstratives and locatives

At the end of Section 3.31 above, it was pointed out that as part of a vowel cluster, [i] is underlyingly /i/ almost always. The exceptions are found in cases of irregular or rarely occurring morphological processes, so that palatalization may fail to follow a diphthong containing [i] as its final element.

Whereas suffixation is a highly productive process in Inupiaq, only one prefix is found in the language. The prefix ta-, denoting specificity, is restricted in use to demonstratives, which may occur either free-standing or with the prefix, as shown by these Barrow forms:

(51)

manna	'this one, visible, extended'
amna	'that one, invisible or distant'
unna	'the one below, down there'
iġña	'that one, visible, of restricted area'
inna	'thus'

tamanna
taamna
taunna
taigña
tainna

In the pair inna/tainna, prefixation of ta- effects no change in the stem, apparently permitting the normally disallowed clustering of I with another vowel. Since nn remains unpalatalized after prefixation takes place, we infer that I is indeed present here.

The Kobuk dialect finds a different resolution to the problem of prefixing a vowel-final morpheme to an I-initial stem. Upon prefixation, Kobuk itna 'thus' becomes

taatna. Here, ī alternates with a, although this case represents an extension of the usual vowel alternation rule as described in Section 4.21. Normally, alternating ī is the first element of a vowel cluster, whereas here it is the second.

In terms of morpheme structure, this problem derives from the fact that stems can begin with /ī/ while suffixes cannot. If a morpheme is suffixed to another which is vowel-final, there is no chance of creating an ī-final vowel sequence. Since stems may begin with ī, a sequence of Vī may be created on the rare occasions that something is prefixed to a stem. Tainna is a clear example of such a situation.

A more ambiguous example is found in cases where the locative noun case inflections -mi and -ni occur with the existential verb stem īt-. The forms iglumi ittuq and iglumiittuq coexist with the meaning 'is in the house':

(52) iglu + -mi (+) īt- + -tuq.
'house' locative 'be' 3s

Although Inupiaq words are normally recognized as discrete entities by speakers and confusion as to the presence of word boundaries does not occur, this case can be seen as an exceptional "running together" of words or loss of boundary. Otherwise, -miit must be accorded status as a single suffix, be it highly analyzable as -mi + īt-.

There is reason to look on -miit as a suffix

(-niit pl) if the situation of the locative is compared to that of other noun cases. The directional noun case inflections (to, from, through) all have corresponding denominal suffixes which are followed by verb endings.

(53) iglumun 'to the house' iglumuktuq 'goes to the house'
iglumiñ 'from the house' B iglumiñŋaqtuq 'comes from the house'
iglukun 'through the house' iglukuaqtuq 'goes through the house'

The suffixes -muk-, B -miñŋaq-, and -kuaq- correspond to the noun case endings -mun, -miñ, and -kun respectively. The aequalis case (-tun) and the modalis (-mik) have no equivalent postbases. If the directional postbases are considered as such, -miit may be also, although it bears a highly transparent morphology which the others do not.

In any event, the entity -miit, whatever its status, again violates basic notions of vowel clustering and palatalization. Other instances of ii are consistently followed by palatalization:

(54) iiñiqsuq 'is indeed starving'
aġnaġiitchuq 'is an ugly woman'
siikłuni 'splitting fish lengthwise in order to clean them'
piiqsuq 'has been removed'

If -miit is indeed the joining of -mi to ĩt- as appears to be the case, then the long vowel may be analyzed as /i/ plus /ĩ/, a sequence that occurs nowhere else in the language.

3.62 Enclitics

The last instance where palatalization may fail to apply as expected is also a case where assimilation was found to be subject to irregularity, that is, across enclitic boundaries. Usually, the palatalization rule functions between stems and enclitics:

(55)

B qimmiq K qipmiq 'dog'	+	-lu	→	B qimmiġḷu K qipmiġḷu 'and the dog'
savik 'knife'	+	-lu	→	saviglu 'and the knife'
ini 'place'	+	-lu	→	inilu 'and the place'
B qimmich 'dogs'	+	-lu	→	B qimmiḷḷu 'and the dogs'
ilvich 'you$_1$'	+	-li 'in turn'	→	ilviḷḷi 'and you$_1$ in your turn'
iliptik 'you$_2$'	+	-li	→	iliptigli 'and you$_2$ in your turn'

For many speakers, palatalization is irregular when an enclitic boundary is involved:

(56)

ilvich 'you$_1$'	+	B -ptauq K -ptuuq 'too'	→	B ilvichtauq K ilvichtuuq 'you$_1$ too'
ilivsi 'you$_3$'	+	B -ptauq	→	B ilivsiptauq 'you$_3$ too'
savik 'knife'	+	B -ptauq	→	B saviktauq 'the knife too'

but,

aasii 'thus'	+	-li 'and'	+ -ptauq	→	aasiiḷivsauq 'and thus too'
aasii	+	-ptauq		→	aasiivsauq 'thus too'

The last vowel of all the above stems is /i/. Persons who provided the above data do not apply palatalization every time there is a vowel which would normally trigger it. This case is not equivalent to that where younger speakers confuse /i/ and /ĭ/ and are therefore unable to apply palatalization in the correct environments ("correct" meaning according to conservative norms). Flexibility in the palatalization of enclitics is found in the speech of people who do not normally allow this sort of variation at any other point in the word. Regularly palatalized forms such as Barrow ilvitchauq 'you$_1$ too', ilivsivsauq 'you$_{3+}$ too', and saviksauq 'the knife too' are possible in very conservative dialects but not normally used even by middle-aged speakers.

The existence of the Barrow form ilvichtauq stands as further proof that the case of enclitics is special within the language. At no other point in the word would any speaker whatever permit the cluster čt, since palatals do not otherwise cluster with alveolars. The only violation of this general restriction comes at enclitic boundaries and lends support to the hypothesis that this boundary should be treated differently from others. Just as palatalization does not apply from one phonological word to another, it now fails to apply from inflected stem to enclitic, which are joined by a boundary midway in strength between the word boundary and the usual morpheme boundary.

3.7 Regressive palatalization

Palatalization has thus far been shown to apply progressively, with palatal consonants always following the vowel /i/. There are some cases of regressive palatalization, however, where an alveolar consonant becomes palatalized before /i/.[9]

There is a series of postbases -- e.g. -liqi- 'to do something with a NOUN, deal with a NOUN', -liq- 'provide with a NOUN', -liuq- 'to make', -li- 'to make', -ni 4s poss -- which upon suffixation to a stem, may give rise to alternate forms identical in meaning. The two modes of suffixation for these postbases are the following: 1) upon suffixation, a stem-final consonant is truncated:

(57)

qayaq 'kayak'	+	-li 'make'	→	qayali- 'make a kayak'
kamik 'boot'	+	-li	→	kamili- 'make a boot'
aqaya 'mud'	+	-liqi 'deal with'	→	aqayaliqi- 'play or work with mud'
kamik	+	-ni 4s poss	→	kamini 'his own boot'

2) Upon suffixation, the last stem vowel and anything following is deleted, along with the initial C of the postbase; the final segment of the stem is now a consonant, which, if single, undergoes gemination:

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9. I thank Edna MacLean for bringing these data and her analysis of regressive palatalization to my attention. Observations on the relationship of regressive to progressive palatalization and on the functional role of the former are my own.

(58) qayaq + -li ⟶ qayyi-
'make a kayak'

kamik + -li ⟶ kammi-
'make a boot'

aqaya + -liqi ⟶ aqayyiqi-
'play, work with mud'

kamik + -ni ⟶ kammi
'his own boot'

We will refer to this process by Rischel's term replacive suffixation (see 6.3 and Rischel 1974:191-197). The effect of the replacive suffixation process is to place the suffixal /i/ immediately after the last internal stem consonant. In the reduced form of qayali-, which is qayyi-, then, the material between parentheses here is deleted and the starred C is geminated: qay*(al)i-.

If the last medial consonant of the stem happens to be t, the replacive suffixation process would then produce the sequence /ti/, which has been said not to exist (see 3.32). The following variation takes place along with the usual suffixation process as described above:

(59) atiq + -liq- ⟶ atiliq- / atchiq-
'name' 'provide' 'provide with a name'

atiq + -ni ⟶ atini / atchi
'his own' 'his own name'

mamitaq + -liq- ⟶ mamitaliq- / mamitchiq-
'bandage' 'provide' 'provide with a bandage'

quqtaq + -liqi- ⟶ quqtaliqi- / quqsiqi-
'chamber pot' 'deal with' 'do something with a chamber pot'

supputi- + -liq- → B suppusiq- / supputchiq- [10]
'gun' 'provide' K suppusriq- 'provide with a gun'

kiguti + -liqi- → B kigusiqi- 'have a toothache'
'tooth' K kigusriqi- 'brush one's teeth'

Normally, gemination of t is a regular process as in the dual form of atiq 'name', which is attak. The replacive suffixation process, on the other hand, yields the palatalized variant of [t:] which is [č:] as in atchiq- and atchi. In quqtaq gemination is impossible since there is a medial cluster rather than the required single consonant. Without gemination, replacive suffixation itself does not alter the cluster, but regressive palatalization plus assibilation gives s in quqsiqi-. In 'provide with a gun', the form B suppusiq-/K suppusriq- shows regressive palatalization and assibilation of the stem t but neither gemination -- as in supputchiq -- nor the suffixal l -- as in atiliq-. The expected form *supputiliq- is in fact non-occurring. The postbase -liq regularly triggers syncope in ĩ-final stems, cf. tivliqsuq 'smells, lit. is provided with an odor' from tipĩ 'odor' + -liq- 'provide' + -tuq 3s. Whereas supputchiq- is regular when compared to atchiq- in that both show gemination, suppus(r)iq- is odd in its lack of gemination (*asiq- is impossible for atchiq- 'provide with a name'). There is in fact a general ten-

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10. The forms meaning 'provide with a gun' show a special alternation discussed below.

dency for the t of the stem supputī not to geminate, cf. supputik dl and extremely rarely, supputtak.

Regressive palatalization is not simply the reverse of its progressive counterpart. The difference in the two, other than direction, lies in the fact that t is the only consonant which is subject to palatalization regressively, whereas the whole range of alveolars may undergo progressive palatalization. Resistance of alveolars other than t to regressive palatalization is demonstrated by the following forms:

(60) ulu + -liq → ululiq- / ulliq-
'woman's knife' 'provide' 'provide with a woman's knife'

tuttulik + -liq → tuttuliliq- / tuttulliq-
'caribou skin boot' 'provide with a caribou skin boot'

qaniq + -liq → qaniliq- / qanniq-
'mouth' 'provide with a mouth'

Functionally speaking, we might say that the only "purpose" of regressive palatalization is to avoid the impermissible sequence /ti/ (see 3.32). This process does not apply to alveolars other than t, which are not limited in terms of the type of i which may follow them.

Of the progressive palatalization processes discussed here, only assibilation (t → s) is present in West Greenlandic. What we have called regressive palatalization in Alaskan Inupiaq actually applies to t only and may thus be considered regressive assibilation, a process which seems also to occur in West Greenlandic, cf. WG ipusiRpaa

'provides it with an oar' from iput(ĭ) 'oar' + -liq 'provide' + -paa 3s-3s, which is AI ipusiġaa from iput(ĭ) + -liq- + -kaa 3s-3s. Rischel (1974:202) writes concerning this form, "it seems most reasonable to assume a fusion of the obstruent and voiceless character of /t/ with the continuancy of /l/, rather than a spurious replacement of /t/ by /s/ in these environments." According to our analysis, the change from t to s is due to regressive assibilation; the absence of a suffix allomorph with initial l following stems in ti, i.e. *supputiliq-, is indeed puzzling, but in fact the suffix-initial l never appears in any possible form of this word. While the fusion explanation appears logical, it is not highly motivated in terms of there being other related processes in the language.

3.8 Conclusion

In the course of this chapter, we hope to have demonstrated the need for a distinction between two types of i based on the very productive process of palatalization of alveolars. The precise nature of the distinction will vary with one's theoretical viewpoint. We have to this point assumed that two types of i must be recognized in the language, although we have not said to what properties that difference should be attributed. Underhill (1976) posits a fourth vowel segment underlyingly for West Greenlandic and thus proposes a solution involving a rule of absolute neutralization. Our discussion of how this problem should be

treated comes following the presentation of all pertinent information in Section 4.7.

As an historical note to what has been discussed concerning palatalization, we offer some speculation as to the origin of this process within Inupiaq. The process of palatalization itself appears phonologically "natural" in that a coronal consonant becomes high in the environment of a high, front vowel. Since palatalization of alveolars is (nearly) exceptionless, it is also true that alveolar consonants are not found following what are historically high, front vowels since they become palatalized. Other Eskimo languages, nevertheless, do not prohibit these sequences. What is prohibited to some degree in Yupik languages are sequences of ti. Although ti exists in Central Yupik -- not underlyingly, however -- there are cases in which this sequence undergoes a regressive change, as in tuqučiuq 'kills something' from tuqute- 'kill' + -i- half-transitive + -uq 3s.[11] There is additional evidence for regressive assibilation in Siberian Yupik. Probably, then, regressive assibilation was the original "palatalization" process, which was adapted to operate progressively and became generalized to apply to alveolar consonants other than t. West Greenlandic has assibilation, apparently both regressive and progressive; Barrow has regressive

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11. This example was pointed out to me by Steven Jacobson (personal communication).

assibilation and general progressive palatalization of all alveolars; Kobuk adds (restricted) palatalization of velars to the Barrow system.

These facts suggest possible historical developments leading to the present-day situation. Rischel (1974:265-266) proposes that palatalization originally applied generally to consonants throughout Inupiaq following /i/ and was eventually restricted to coronals. The two i's then merged leaving alternation of palatals with non-palatals an abstract regularity depending on the two i morphophonemes. Finally, most palatalization was lost in some dialects like Greenlandic, which retains only assibilation.

We suggest rather than all Inupiaq progressive palatalization is an innovation based upon an original regressive assibilation process and that the greater the scope of palatalization in a dialect, the greater the innovation. Kobuk then appears to be the most innovative dialect in terms of palatalization, since it applies progressive palatalization to both alveolars and velars.

CHAPTER IV: Vowels

4.1 Introduction

The historical vowel system of Proto Eskimo underwent a simplification in Inupiaq from four phonetic vowels to three. What became of the so-called "fourth vowel" or schwa in Inupiaq constitutes one of the most interesting and often discussed problems of Eskimo linguistics. Traces of schwa are unmistakably present throughout the phonology of the language, but problems arise in trying to decide the synchronic status of this vowel within the phonological system.

The primary theoretical interest of this question resides in the opportunity it provides for examination of the interface between synchronic and diachronic phonology. Can speakers be said to possess a grammar containing a fully specified four-vowel system identical to the historical one? This analysis would depend on the absolute neutralization of the fourth vowel and is objectionable to many linguists who would feel it denies the phonetic reality of the language in favor of a convenient but strictly historical solution.

Several important alternations of the language

depend upon a contrast between the two types of i, which behave differently. Whereas it may often be possible to account for synchronic residue of historical alternations, i.e. alternations whose conditioning was once phonetically transparent, as lexicalizations, this is not always easy in Inupiaq. We do speak of lexicalization in the case of some forms which we doubt are analyzed by speakers into their component morphemes. Due to the productive nature of affixation in Eskimo, however, it is difficult to speak of lexicalization for cases such as palatalization across morpheme boundaries as discussed in Chapter III.

Having presented the palatalization evidence, we continue the discussion of processes which depend upon the putative i/I distinction. Vowel alternations, which constitute further evidence for subdividing i into two types, will be presented in this chapter and then related to other processes in an effort to depict and discuss the underlying vowel system. Subsequently, long vowels and diphthongs will be examined, thus completing the discussion of Inupiaq vowels.

Various types of vowel alternation exist in Inupiaq, from phonetically conditioned and highly productive alternations to randomly occurring ones whose motivation within the synchronic phonology of the language is opaque. It is the first type of alternation which will concern us

here, although less productive cases will be mentioned as well. Most of the important alternations in the language involve the fourth vowel ĭ, and it is largely on this basis that ĭ may be deemed to play any sort of synchronic role within the phonology of Inupiaq.

For the sake of clarity of presentation, we continue to assume that ĭ must be recognized in some way as a distinct entity. In this way, our examples may refer to ĭ, based not upon historical evidence but upon a synchronic definition of ĭ as those occurrences of i which may precede alveolar but not palatal consonants and which undergo the alternations described below.[1] We at times use the symbol ĭ in orthographic representations to point out the presence of this vowel in a given form.

4.2 The alternation of ĭ with a

4.21 Alternation before another vowel

Alternation of [i] with [a] is widespread throughout Inupiaq and occurs in two major environments. The first case involves the positioning of ĭ before another vowel by means of affixation.

(61) inĭ + -a ⟶ inaa
'place' 3s poss 'his place'

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1. Cross-checking with the data provided in Chapter III will satisfy the reader that the same instances of ĭ which fail to trigger palatalization are those which alternate with other vowels.

atiqĭ + -uraq → atiqauraq
'parka' diminutive 'little parka'

aŋutĭ- + -u- + -tuq → aŋutauruq
'man' cop 3s 'it is a man'

ini + -it- + -tuq → inaitchuq
'place' 'not have' 3s 'he has no place'

Sometimes [i] fails to alternate with [a] before the same suffixes found above, and in these instances the vowel is demonstrably /i/:

(62) B qimmiq
K qipmiq + -u- + -tuq → qimmiuruq
qipmiuruq
'dog' cop 3s 'it is a dog'

iki + -u- + -tuq → ikiuruq
'wound' 'it is a wound'

iki + -it- + -tuq → ikiitchuq
'not have' 'he has no wounds'

Those i's which alternate with a are kept distinct from those which do not by speakers of the language. Next to forms like aŋutauruq, showing alternation, are sometimes found competing forms like aŋutiuruq where alternation does not function. The latter cases are judged to be innovative forms by older speakers.

Other than stems, morphemes seem not to begin with ĭ, although ĭ is found morpheme-finally. For this reason the above alternations all take place preceding, but not following a morpheme boundary. In the single case of Kobuk taatna 'thus' (from ta- + itna) the ĭ/a alternation is found to the right of the +, as discussed in Section 3.61.

The straightforward prefixation of ta- to B inna 'thus' and its Kobuk cognate itna gives the correct Barrow

form tainna and the unacceptable Kobuk *taitna (which is, in fact, the form found at Anaktuvuk Pass). A context which is opaque with regard to palatalization is created, since the diphthong ai is regularly followed by palatal consonants. While Barrow permits the unusual sequence ain in this single form, Kobuk does not, and has instead taatna.

Usually I alternates before another vowel:

Rule 10 Vowel lowering

I → a/___V

In the case of K taatna, vowel alternation has applied following a V, which situation is not handled by Rule 10. The type of alternation found in taatna represents, it seems, an extension of the basic rule as stated, since V+I sequences do not regularly arise.[2]

There are, in addition, a limited number of cases in which I as part of a vowel cluster is indeterminate as to its underlying value, i.e., it may be /ĭ/ or /i/. When the postbases K -(ŋ)anik, B -(k)anik 'already do' and -(g)aqsi 'be about to' are suffixed to I-final stems, it is unclear whether vowel alternation results, e.g. tiŋiaqsiruq 'is about to take flight' where tiŋĭ- 'take flight' can be shown to contain final I (cf. tiŋiniaqtuq 'will take flight', where the plain n reveals the presence

2. There may have been a historical rule of vowel alternation taking I to a in the environment of another vowel, i.e. preceding or following (cf. aavġum 'whale' rel from *aġĭvĭq in Section 4.53).

of a preceding Ī). Normally, where Ī fails to alternate adjacent to another vowel, e.g. aŋutiuruq 'is a man', we are dealing with an innovative form whose conservative doublet shows alternation, viz. aŋutauruq. For the expanded forms of tiŋĪ-, however, we can find no equivalent forms where the stem Ī is not followed directly by the suffix vowel. Either these vowel clusters contain Ī or else Ī has here changed to /i/. There is no way to determine, however, if such alternation has occurred. (The initial consonants of the two suffixes in question are found with t and ṭ-ending stems, cf. K tikiñŋanik-, B tikiṭkanik- 'already arrive' and tikiqaqsi- 'be about to arrive' from tikiṭ- 'arrive'.)

4.22 Alternation of Ī with a before a consonant

Once alternating i's are identified as Ī, the above alternations are seen as phonologically conditioned by a suffixal vowel and can be accounted for by rule. In other cases, however, the phonological conditioning of the Ī/a alternation is not evident and may be nonexistent synchronically.

The suffixation of certain morphemes causes the gemination of a single medial stem consonant.[3] When that consonant is followed by Ī, this vowel alternates with a.

3. The synchronic process of gemination must be seen as morphologically conditioned, although phonological conditioning is doubtless present at some deeper level. These questions are taken up in Chapter VI.

Dual nouns, for instance, often show gemination and subsequent vowel alternation:

(63)	kamik	'boot'	kammak	dual
	tupiq	B 'tent'	tuppak	
		K 'house'		
	aiviq	'walrus'	aivvak	

When a singular noun ends in a vowel, gemination in the dual is optional, and vowel alternation occurs only following gemination:

(64)	ini	'place, room'	inik or innak	dual
	iri	'eye'	irik or irrak	

Some singular nouns contain a medial cluster or long C rather than a single consonant.[4] In this case gemination cannot apply in dual forms, and vowel alternation occurs:

(65)	aġviq	'whale	agvak	dual
	siksrik	'ground squirrel'	siksrak	
	B punniq	'loaf of bread'	punnak	

Occurrences of i not subject to alternation in the specified environment are found to be /i/:

(66)	savik	'knife'	savvik	dual
	amiq	'skin'	ammik	
	qargi	'men's house'	qargik	
	iki	'wound'	ikik	
	B qimmiq	'dog'	qimmik	
	K qipmiq		qipmik	
	aqargiq	'ptarmigan'	aqargik	

Singular nouns ending in k and having a medial cluster or long C form their dual by lengthening the last vowel, e.g. manniik 'eggs$_2$' from mannik 'egg', since their

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4. Apparently, all stems whose last vowel is an I preceded by a cluster or long C have a final consonant. That is, we have found no stems of the shape C$_0$VCCĪ#.

duals cannot be distinguished by the usual suffixation of k nor by gemination of a single medial C (see also 4.81).

Another suffix which functions like the dual in that it triggers gemination and subsequent alternation of ĭ is the nominalizer -q 'result of VERB'. It is probable that this -q is no longer synchronically productive, since it cannot be suffixed to all verb stems and when it can the result is sometimes lexicalized.[5] Nonetheless, the function of the -q is clear as are the phonological processes which it triggers. For our purposes here, the ĭ/a vowel alternation is clearly and predictably present.

(67)

sana-	'to carve'	sannaq	'curved chip of wood, from carving'
piḷak-	'to butcher'	piḷḷaq	'piece of a butchered animal'
saluk-	'to be thin'	salluq	'thin, skinny person'
niġi-	'to eat'	niġġiq	'part of something gnawed or eaten away'
avĭk-	'to halve'	avvaq	'half'
paŋalĭk-	'to gallop'	paŋallaq	'a caribou which is skinny from running too much'
titĭq-	'to mark'	tittaq	'a mark'
qupĭ-	'to cleave'	quppaq	'a cleft'

A verbal suffix which follows the pattern of vowel alternation described above is -qtu- meaning 'VERB too much'.[6]

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5. Bergsland (1955:100) apparently attributes the deverbal postbase -q to a reduced form of his -nĭq 'action noun', whose "old variety -(nĭ)q" he finds in qippaq 'a coil', from qipĭ- 'to coil, wind'.

6. These data are from MacLean, Barrow Inupiaq Postbases, unpublished.

(68)	siñĭk-	'sleep'	siññaqturuq	'sleeps too much'
	qiñĭq-	'look'	qiññaqturuq	'looks too much'
but,	niġi-	'eat'	niġġiqsuruq	'eats too much'

The above instances of ĭ/a alternation occur in definite morphological environments, i.e., the specific suffixes and inflections listed. Whether these environments can be characterized phonologically will be taken up after the other vowel alternations are presented.

There exist other cases of ĭ/a alternation where the morpheme which triggers gemination and subsequent vowel alternation is not entirely clear:

(69)	siñĭk-	'sleep'	siññaktuqtuq	'dreams'
	aġvĭq	'whale'	aġvaktuq	'kills a whale'
	aivĭq	'walrus'	aivvaktuq	'kills a walrus'[7]

4.3 The ï/u alternation

The ĭ/a alternation is often discussed in the literature on Greenlandic, whereas any alternation between ĭ and u is rarely mentioned, being probably of minimal synchronic interest in that group of dialects. Stephen Anderson (1974) and Robert Underhill (1976), on the other hand, derive the u of the relative case marker A1 -(u)m (WG -(u)p) from ĭ.[8] Although this relative u is clearly cog-

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7. A -k postbase meaning 'kill (a game animal)' is apparently present in aġvak- 'kill a whale' and aivvak- 'kill a walrus'. This suffix behaves strangely in that vowel-final stems take a -t (not -k) with this meaning, e.g. tuttut- 'kill a caribou' (tuttu + -t) and stems in /iq/ take Ø, e.g. natchiq- 'kill a seal' (natchiq + Ø).

8. "...in Greenlandic schwa always becomes a (before vocalic suffixes), u (before p), or i (elsewhere)" (Anderson 1974:179).

nate with schwa in the Yupik languages (Inupiaq aġviġum = Yupik aRveRem) and very likely reflects a Proto Eskimo schwa, there is no justification for accepting this alternation as a synchronic process of any Inupiaq dialect. While ĭ may precede the relative -m, it does so as part of the stem and not of the inflection, just as any other vowel might. It becomes difficult otherwise to distinguish ĭ which alternates with u before m and that which fails to alternate (see also 6.213).

4.31 Imperatives

The dialects treated here require recognition of a synchronic ĭ/u alternation to account for a number of morphophonemic variations which are present. The imperative suffixes -iñ 2s and -uŋ 2s-3s trigger this alternation in ĭ-final stems:

(70)

stem	gloss	intrans. imperative	trans. imperative
iga-	'cook'	iggaiñ	iggauŋ
niġi-	'eat'	niġġiiñ	niġġiuŋ
supĭ-	'blow'		suppuuŋ
atĭ-	'put on'		attuuŋ
tiŋĭ-	'take flight'	tiŋŋuiñ	
mayuq-	'climb'	mayuġiñ	mayuġuŋ
siñĭk-	'sleep'	siñigiñ	

(Vowels which have undergone alternation with u are underlined.)

Stem-final ĭ alternates with u when imperative endings are suffixed, with other vowels -- a, i, and u -- showing no change. As was the case with the ĭ/a alternation, gemination appears to be a prerequisite to vowel

alternation.[9] Normally, suffixation triggers neither gemination nor vowel alternation in these ĭ-final stems, as shown by forms such as supiqaa 'blows on it', atiqiqa 'I put it on', tiŋiniaqtuq 'it will take flight', etc.

4.32 Instrumental nominalizations

There is another case where the positing of an ĭ/u alternation allows us to account for the data. The instrumental nominal suffix -(u)t(ĭ)[10] triggers gemination and apparent alternation of stem-final ĭ with u:

(71)	iga-	'cook'	iggan	'cooking utensil'
	niġi-	'eat'	niġġiñ	'eating utensil' (usually pl niġġisit)
	amu-	'pull'	ammun	'line, rope'
	supĭ-	'blow'	suppun	'gun'
	tiŋĭ-	'take flight'	B tiŋŋun	'airplane'

Suppun and tiŋŋun seem to demonstrate vowel alternation similar to that in suppuuŋ and tiŋŋuiñ in (70) above. In the imperatives, however, there is no reason to believe that the u which appears following the geminate may be part of the ending, and we thus analyze it as an alternating stem-final vowel. The instrumental suffix, on the other hand, has an initial u which is normally found with consonant-final stems:

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9. Competing with forms showing vowel alternation are innovative forms without alternation, such as tiŋŋiiñ 'fly away!' or suppiuŋ 'blow on it!'.

10. We adopt Bergsland's (1955) parenthesis notation to show that some elements of the suffix may be absent in some allomorphs. Thus, the morpheme -(u)t(ĭ) may appear with or without either or both of its vowels.

(72)

amiq-	'to cover a boat frame with skin'
amiun	'a needle used in this task'
savak-	'to work'
savaun	'tool'
suvlaq	'to open an air hole'
suvlaun	'pipe cleaner'
tuyuq-	'to send'
tuyuun	'missive'

When the instrumental suffix causes deletion of a stem-final consonant, the suffix-initial u presents itself. It is important here to decide whether the u in suppun and tiŋŋun belongs to the stem or the suffix.

Both solutions can be argued for. The stem supĭ- may plausibly be subjected to deletion of its final vowel, as discussed in Section 4.5. The vowel-initial allomorph of the suffix -(u)t(ĭ) then follows with subsequent apocope and nasalization of the final t by Rule 5. This in fact appears to be Rischel's analysis of the problem (1974: 287).

In a synchronic analysis of cases like suppun, it seems reasonable to attribute the appearance of u to alternation of stem-final ĭ, putting this form on a par with the imperative suppuuŋ. Since the instrumental suffix which is present also has an initial u, although this vowel does not appear otherwise with vowel-final stems, it seems equally valid to consider u as part of the suffix. In Central Yupik and West Greenlandic where u appears in comparable instrumental forms but which do not otherwise have alternation between ĭ and u, the latter solution is the only possibility.

4.4 Conditioning of the vowel alternations

At this point it is necessary to differentiate the environments in which ĭ alternates with a from those where it alternates with u. The problem is not one of ĭ assimilating to a following vowel, since ĭ is found to alternate with a before i, u, and a, and with u before i and u, in addition to alternation before consonants.

We propose that the vowel quality of alternants of /ĭ/ is conditioned by a following consonant, although this consonant is not always present in surface forms. The degree of abstractness required to motivate this solution, however, may not make it a viable synchronic analysis, as discussed below.

4.41 The ĭ/a alternation

Reviewing the environments in which ĭ is found to alternate with a, we find the most productive alternations before vowels and in dual nouns. ĭ does not always become a before the dual morpheme -k, though, as illustrated by competing forms like inik and innak from inĭ 'place' and irik and irrak from irĭ 'eye'. These doublets show that the gemination rule must have had a chance to apply for vowel alternation to occur before consonants. Apparently, gemination must be conditioned by suffixation and not underlying or resulting from consonant assimilation in order for vowel alternation to apply. B punnĭg 'loaf' and B tuullĭk 'yellow-billed loon' both have ĭ following a geminate not

derived by rule. Suffixation of the dual morpheme -k to these singular forms gives the gemination rule a chance to apply, although it cannot alter the medial geminates found in these cases. Vowel alternation follows nevertheless: punnak 'loaves$_2$', and tuullak 'loons$_2$'. Of course a final k other than the dual marker will not trigger vowel alternation, as attested by kamĭk 'boot' and tuullĭk.

A second morpheme which triggers the ĭ/a alternation -- and gemination -- is the nominalizer -q (see 4.22), found in quppaq 'cleft' (qupĭ- + -q). Again, gemination is present before the a alternant of ĭ, and q's other than the nominalizing morpheme do not trigger the alternation, e.g. titĭq-/tittaq 'to mark'/'a mark'.

Of other consonant-initial suffixes before which vowel alternation is found, all govern gemination and contain an initial velar or uvular (-k, -q, -qtu-, etc.); we may interpret the presence of this back consonant as the crucial factor conditioning the ĭ/a alternation. While gemination precedes the ĭ/u alternation as well, a following velar consonant determines that the resultant vowel will be low and back.

Vowel quality in cases of vowel alternation which are found preceding a suffixal vowel -- aŋutauruq, etc. -- may also be argued to be influenced by a velar consonant, which in these cases is underlying. An initial velar consonant associated with the suffixes may condition alternation of ĭ with a, although this velar appears on the

surface only when the suffixes follow a long vowel or diphthong.

(73)

	aŋutĭ- 'man'	+	-u- cop	+	-ruq 3s	→ aŋutauruq 'it is a man'
	aġnaq 'woman'	+	-u-	+	-ruq	→ aġnauruq 'it is a woman'
B	umiaq 'boat'	+	-gu- cop	+	-ruq	→ umiaguruq 'it is a boat'
K	umiaq	+	-ŋu- cop	+	-ruq	→ umiaŋuruq 'it is a boat'

Similarly, 'his place' (inĭ + -a) is inaa, but 'his boat' is umiaŋa in both Kobuk and Barrow. 'He has no place' is inaitchuq, but 'he has no ice chisel' (tuuq + {q, ŋ} iṭ- + -tuq) is tuuqitchuq in Barrow and tuuŋitchuq in Kobuk.

The status of this q or ŋ will be discussed in Chapter V. However, the velar is clearly associated with the suffix and not the stem, as shown by the behavior of stems in q, since there are no grounds for positing a q/ġ or q/ŋ alternation. The velar may be seen as present underlyingly and deleted where it will not give rise to a series of three vowels, hence aġnauruq but umiaguruq. (ŋ) This deletion, however, takes place after the velar C has triggered vowel alternation in forms like aŋutauruq.

4.42 The ĭ/u alternation

Discovering the conditioning factors for the ĭ/u alternation is more difficult than for ĭ/a. As with the ĭ/a alternation, gemination of a preceding consonant may condition the ĭ/u alternation. Forms like

suppuuŋ and tiŋŋuiñ contain no consonant which can be said to condition the u alternant of Ĭ in the way that velars are found to condition the a alternant.[11] Nor can Ĭ/u be acceptably handled as an "elsewhere case" of Ĭ alternating with u in the absence of a velar.

The nominalizing suffix -vik 'place; time' governs gemination with yet another result in the case of post-geminate Ĭ:

(74)	iga-	'cook'	iggavik	'kitchen'
	niġi-	'eat'	niġġivik	'table'
	supĭ-	'blow'	suppivik	'break-up time'
	tiŋĭ-	'take flight'	tiŋŋivik	'September' (when birds migrate)

Normally, Ĭ alternates with a or u following gemination. In this single case we find lack of alternation of Ĭ following a geminated consonant. Or is it lack of alternation? The final vowel of supi- and tiŋi- is clearly Ĭ, since it does not trigger palatalization and has been shown to undergo vowel alternation elsewhere. The underlying status of the stem-final vowel in suppivik and tiŋŋivik, however, is indeterminate; there is no way to tell whether it is /Ĭ/ or /i/, since insertion of an alveolar-initial morpheme, as a "test" for palatalization, would remove the environment for gemination.

The Ĭ/u alternation is not conditioned in an obvious manner by any surface segment. It occurs with only a

11. The West Greenlandic imperative inflections have an initial velar, -gin 2s and -guk 2s-3s, although there is no Alaskan evidence indicating a velar in this position (see also note 12).

few suffixes, and this limitation allows us to suggest reasonably that the alternation has been morphologized and that the suffixes in question are specially marked to condition it. The imperative inflections -iñ 2s, and -uŋ 2s-3s, which trigger the alternation do not themselves function in a synchronically regular fashion. It is these irregularities, nonetheless, which suggest a possible original phonological conditioning for the ĭ/u alternation.

Following t-ending stems, a consonant appears as part of the imperative endings and is not present with other stems:

(75)

makittin!	'stand up!'	from makit-
aqpattin!	'run!'	from aqpat-
tuqurruŋ!	'kill it!'	from tuqut-
qamirruŋ!	'turn it off!'	from qamit-

The -iñ intransitive ending is here -tin, and the transitive -uŋ becomes -ruŋ, with predictable assimilation of a preceding t. While we do not propose synchronic phonological rules to explain the alternants of these suffixes, it is possible that an initial alveolar C in the underlying form of the suffixes (-tin, -ruŋ) may be related to the original conditioning for the ĭ/u alternation in tiŋŋuiñ and suppuuŋ.

The instrumental -(u)t(ĭ) also exhibits an initial r following stems in -t: tuqut- 'kill' + -run instrumental → tuqurrun 'instrument for killing'.

While it is difficult to see in terms of natural phonological processes how these suffix-initial alveolars

might condition the alternation of a preceding ĭ with u, this possibility must be considered, for just as the ĭ/a alternation is associated with a following velar or uvular, an alveolar is present at some level when ĭ alternates with u. Synchronically, however, no phonological conditioning for this vowel alternation is evident, and the suggestion that an alveolar consonant may be responsible is highly speculative, even historically.[12]

The evidence presented here brings up the question of whether all suffixes are in fact consonant-initial underlyingly, since the apparent vowel-initial morphemes we discuss all have allomorphs which bear an initial consonant. There are nonetheless suffixes which are always vowel-initial, at least synchronically, cf. -ayaaq 'young, incipient' which gives natchiayaaq 'young seal' from natchiq 'seal' and uvluayaaq 'dawn' from uvluk 'day'.

4.5 The ĭ/Ø alternation

4.51 Stem-final alternation

Frequently throughout Inupiaq, the vowel ĭ is found

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12. West Greenlandic imperative endings generally have initial velars, e.g. akigit 'answer!' from /aki + git/ and akiguk 'answer him!' from /aki + guk/. Alternation of a stem ĭ with u is not possible before these inflections, cf. supiguk 'blow on it!' Carl Christian Olsen reports that both supinagu and supunagu are possible in WG for 'don't blow on it!' (from supĭ- 'blow' + -nagu 2s-3s neg imp). The ĭ/u alternation is thus present to some extent in that dialect and occurs before an alveolar consonant as we predict.

to alternate with zero, that is, either epenthesis or syncope of ĭ takes place, depending on which solution one accepts. As discussed in Section 2.312, if a singular noun ends in n, this n may alternate with tĭ in the presence of suffixal morphemes:

(76)	aŋun	'man'	suppun	'gun'
	aŋutik	dual	supputik	
	aŋutit	plural	supputit	
	aŋutim	relative case sg.	supputim	
B	aŋunmik	modalis case sg.	suppunmik	
K	aŋutmik	modalis case sg.	supputmik	
	aŋutinik	modalis case pl.	supputinik	
B	aŋunnaq	'man's coat'		
K	aŋutnaq	'man's coat'		

The ĭ appears stem-finally in forms like aŋutik and aŋutim but fails to appear in aŋun and aŋunmik/aŋutmik. This vowel is identifiable as ĭ since it fails to trigger palatalization in aŋutinun and has been found to alternate with a before another vowel in aŋutauruq 'is a man'. The problem arises as to whether the occasional appearance of this ĭ should be treated as a case of epenthesis or syncope.[13]

Whichever solution is chosen, the conditions under which the rule applies will not be easy to state. If a deletion rule is written, it will have to apply in cases like aŋun (from /aŋutĭ/) but not in inĭ 'place' or aqpatĭ 'runner'. If epenthesis is assumed, it will have to apply

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13. Rischel argues for a syncope rule, based on much the same sort of evidence we present below (1974:222-228).

in aŋutim but not in aŋunmik/aŋutmik from /aŋut/. In either case, a rule of nasalization is required to generate aŋun from either /aŋutĪ/ or /aŋut/, viz. Rule 5.

Given that neither syncope nor epenthesis provides an easy solution, the problem is one of discovering the better solution. While either rule will have to depend heavily on specially marked morphemes to condition its application, the epenthesis rule is necessarily fraught with difficulties in that it may conflict with other epenthesis rules in the language. Frequently, the relative case marker -m is preceded by an epenthetic u, e.g. aġviġum from aġviq 'whale', the plural -t by an epenthetic /i/, e.g. aġviġich, and the dual -k by no epenthetic vowel at all. Only by means of an ad hoc device can the epenthesis of Ī be explained in cases where another vowel would normally be epenthesized or where there is normally no epenthesis; i.e. why does aŋut + -m → aŋutim rather than *aŋutum, as in aġviq + -m → aġviġum?

According to our analysis of assimilation (see 2.31), the failure of assimilation to apply in Kobuk forms like aŋutmik and aŋutnaq is due precisely to the underlying presence of a stem-final Ī. If this Ī is considered to be epenthetic when it appears, then these forms must be marked as exceptional with no difference apparent between t's which do and do not assimilate: makit- + -niaq- → makinniaq- 'stand up' fut, but aŋut + -mik → aŋutmik 'man' mod.

Younger speakers of the language seem to consider the

ɪ̄ to be underlying, since they use forms such as aŋuti 'man' and aŋutimik. Of course, it can always be argued that these speakers have generalized an epenthesis rule rather than lost a syncope rule. Since the epenthesis solution seems to encounter greater difficulties than syncope, we accept the latter for our purposes.

Assuming then a rule of syncope, there are morphemes other than those ending in tɪ̄ which undergo syncope of a final ɪ̄ preceding a suffix. Morphemes which undergo syncope seem not to fit into a natural class, nor do suffixes capable of triggering syncope always do so, as these Barrow examples attest:

(77)

supɪ̄-	'to blow; to break up, of a river in springtime'
sumniq	'the break-up'
qupɪ̄-	'to cleave'
qumniq	'a cleft'
ikɪ̄-	'to burn'
igniq	'fire'
nukɪ̄-	'to crack'
nukiniq	'a crack' (not *nuŋniq)
sipɪ̄-	'to change from female to male (of a fetus)'
sipiniq	'one changed thus' (not *simniq)

Here the nominalizer -niq is found to trigger syncope in some cases but not in others. In many instances words involving the -niq suffix have undergone lexicalization, as is undoubtedly the case with igniq. Whereas syncope is applied optionally in some dialects, cf. aŋunmik vs. aŋutimik, 'fire' is never rendered as *ikiniq, instead of

iqniq, with failure to apply syncope.

Similarly, utĭ- 'remove hair from a skin by soaking' + -raq 'passive' ⟶ B urraq, K utraq 'a skin prepared thus'. We can see that the final vowel of utĭ- is subject to deletion in this case, although its deletion is optional in the doublets utiniq/unniq which also mean 'a skin with hair removed by soaking'. Of the two, unniq is the more conservative form.

The forms tiŋŋutkaa and tiŋŋutigaa 'carries it away' from tiŋĭ- 'take flight' + -utĭ- 'do with or for' + -kaa 3s-3s[14] coexist similarly in the language with the former, which shows syncope, used mostly by older speakers.

4.52 Stem-internal alternation

Stem-internally, penultimate ĭ alternates with zero, the zero alternant often providing the environment for progressive assimilation in forms such as kamŋich 'boots' from kamĭk 'boot'.

(78)	tupĭq K 'house' B 'tent'	+	-ich plural	⟶	tupqich K 'houses' B 'tents'
	tupĭq	+	-um rel	⟶	tupqum 'house' rel
	tupĭq	+	-iñ 2s-3s poss	⟶	tupqiñ 'your house'

14. The 3s-3s transitive suffix used here is -kaa following a consonant and -gaa following a vowel.

tupĭq + -a ⟶ tupqa
3s-3s poss 'his, her house'

tupĭq + -u- + -tuq ⟶ tupquruq
cop 3s int 'it is a house'

tupĭq + -it- + -tuq ⟶ tupqitchuq
'not have' 3s int 'has no house'

aivĭq 'walrus
aivgich plural
aivġum rel, etc. as above

kamĭk 'boot'
kamŋich pl
kamŋum rel, etc.

(79) imĭq- + -tuq ⟶ imiqtuq
'drink' 3s 'he is drinking'

imĭq- + -un ⟶ imġun
inst 'drinking glass'

Vowels other than ĭ do not exhibit a zero alternant upon suffixation of the same morphemes as above:

(80) amiq 'skin; to cover a boat frame with skin'
ammich pl
ammim rel
amiun inst

qayaq 'kayak'
qayyat pl
qayyam rel

sayuq- 'do a motion dance'
sayuun 'a motion dance'

Of the stems ending in alveolars, there are singular nouns in n (or /tĭ/) and verb stems in t. Uninflected nouns with a final n never have a penultimate ĭ.[15] Verb

15. This fact suggests that all uninflected singular nouns ending in n are ultimately derived by means of the instrumental -(u)t(ĭ) suffix described above. This suffix may be analyzed as conditioning the ĭ/u alternation, which would account for the lack of penultimate ĭ in these forms.

stems may end in ï̲t, although we find only one instance of this ï̲ being subject to deletion: sakivï̲t- 'scrape a skin' + -un inst ⟶ sakivrun 'a skin scraper'.

An epenthesis solution to the vowel alternation found in the above forms would posit stems like /tupq-/ for B 'tent', K 'house' and /imġ-/ or /imq-/ for 'drink'. These representations are fairly abstract, since no surface forms may end in a cluster and in the case of 'drink' /imq-/ contains an impossible unassimilated cluster while /imġ-/ violates the prohibition against fricatives occurring in final position. Any solution will have to include unassimilated clusters underlyingly for some Inupiaq forms, so the real disadvantage of epenthesis comes in allowing morpheme-final clusters underlyingly.

Beginning with a stem like /tupq-/, then, ï̲-epenthesis will apply in the absence of suffixes to give the singular tupï̲q and fail to apply to the plural tupqich. The established pattern shows the zero alternant of ï̲ when a vowel-initial suffix is present (tupquruq) and the presence of ï̲ preceding a consonant-initial suffix, as in tupiqaqtuq 'has a tent' or tupiġmik 'tent' mod. To derive a form like tupaaluk 'old tent' where a vowel-initial suffix is preceded by ï̲, which has undergone alternation, would necessitate marking the suffix -aluk, which has no C-initial allomorph, for epenthesis. If epenthesis takes place before the deletion of the final q̲ of tupiq, then it will be hard to state epenthesis so that it fails to apply

in tupqurug, unless of course the underlying q of tupaaluk were marked for deletion before deletion occurred. If epenthesis follows q-deletion, then epenthesis must somehow apply before both vowels and consonants, i.e. in both tupaaluk and tupiq, which makes the rule even more difficult to state.

Syncope would be made to apply in the presence of a stem-final consonant and a vowel-initial suffix, following final C deletion. This way, the ĭ of tupiq would be syncopated in tupqich but not tupaaluk, where the deletion of the stem-final consonant does not allow the structural description of the syncope rule to be met.

In addition, syncope must fail to apply following a consonant cluster in order to avoid a prohibited sequence of three consonants:

(81)

aġvĭq 'whale'	+	-ich plural	⟶	aġviġich 'whales'
ukpĭk 'snowy owl'	+	-ich	⟶	ukpigich[16] 'snowy owls'

Syncope fails to apply following a closed syllable. The epenthesis solution must attribute the variation in the presence of ĭ in tupqich and aġviġich to a difference in underlying form, i.e. /tupq-/ vs. /aġviq-/. The alternative is to write underlying forms like /aġvq-/ with a three consonant cluster which never appears on the surface and is

16. These forms illustrate as well the intervocalic lenition which causes morpheme-final stops to become voiced fricatives, as discussed in Section 5.23.

always broken up by epenthesis: although it is dissatisfying to posit such clusters, this solution at least accounts for the failure of I to alternate following a cluster.

As pointed out earlier, any I-epenthesis rule always has the problem of confusion with other epenthesis rules in the language, notably the epenthesis of /i/ before plural -t and of u before the relative case marker -m.

4.53 A diachronic view of syncope

When all of the data pertaining to the alternation of I with zero are viewed, we find a series of fragments, various morphemes within the language which must bear morphological markings as to whether they trigger I-deletion and myriads of I's marked as to whether they delete in the environment of a specially marked morpheme. This situation is puzzling except when seen in light of the historical facts which have led to the present state of affairs. An excursús into diachrony will shed light on the synchronic process of I-syncope.

When variation exists between two forms in the application or not of the syncope rule, the form containing syncope is consistently the more conservative one, cf. tiŋŋutkaa which is the conservative variant of tiŋŋutiqaa 'carries it away' (see 4.51). The more conservative the dialect, the more syncope of I is found, suggesting that an earlier stage of the language may have had more syncope yet and likely even a truly phonological syncope rule.

Several pieces of evidence seem to confirm this hypothesis:

1. Central Yupik has a rule of syncope which essentially deletes schwa if it comes in the second of two open syllables and provided it is not word-final. Stem-internal ĭ in Inupiaq deletes under similar conditions, but the Yupik rule is far more productive (Reed et al. 1977:32).

2. In some Inupiaq dialects syncope is possible in forms where it may not occur in Kobuk and Barrow. The basic pattern of syncope occurring in the second of two open syllables holds in any dialect.

WG timi 'inland' yields timmut in the terminalis case (Rischel 1974:223) whereas Alaskan timĭ 'body' gives timimun. In his discussion of these forms, Rischel makes clear that they are isolated examples of a sporadic syncope process. Thus, inĭ 'place' does not yield the terminalis *inmut in West Greenlandic but inimut.

The Seward Peninsula dialects also contain instances of syncope found nowhere else in Inupiaq, as BS iksruq 'it burns', which is B and K ikiruq.

3. The Barrow dialect itself provides opportunities for reconstruction of morpheme-internal ĭ's which may once have engaged in productive alternations, so that what are synchronic consonant clusters may be derived from CĭC sequences. Only a few examples permit us to document this hypothesis, since most cases of morpheme-internal syncope are not recoverable synchronically.

Aġviq 'whale' is generally aġviġich in the plural and aġviġum in the relative case, with syncope failing to apply when ĭ follows a closed syllable. Some elderly speakers use the forms aavġich pl and aavġum rel. The vġ cluster indicates that syncope has applied. The initial long vowel and the loss of the first ġ bear explaining nonetheless. If the underlying representation of the stem were /aġĭvĭq/, the various allomorphs could be accounted for by rules which are otherwise independently motivated. The process of intervocalic velar deletion which accounts for the loss of the first ġ is discussed in Chapter V.

(82)

/aġĭvĭq/	/aġĭvĭq + ich/	
aġvĭq	aġĭvqich	syncope
	aĭvqich	velar deletion
	aavqich	V alternation
	aavġich	prog assimilation

(similarly for aavġum)

The plural aavġich is generated when the syncope rule operates from right to left. If syncope operates from left to right, the alternative plural aġviġich results, since the environment for intervocalic velar deletion no longer is present. In any case only one of the vowels of /aġĭvĭq/ can be syncopated at a time, since syncope happens in the second of two open syllables.

The loss of the nearly archaic plural aavġich in favor of aġviġich most likely indicates that the underlying form of this word has been restructured from /aġĭvĭq/ to /aġvĭq/. Given the latter underlying representation, no syncope can take place since ĭ now follows a closed

syllable. If it is valid to reconstruct the form /aġĭvĭq/, then a similar case might be made to relate morphologically the forms aana K 'mother', B 'grandmother' and aġnaq through historical *aġĭnaq.[17]

There is a good possibility that Inupiaq once had a productive, phonetically conditioned rule of syncope as does modern Central Yupik. The various bits of residue remaining from this rule which have been culled from different Inupiaq dialects point in that direction.

The evidence from younger speakers of Barrow Inupiaq does suggest that syncope is being lost completely as any kind of morphological or phonological process. Many words containing applications of the morphologized syncope rule, like sumniq and qumniq, are not used by younger speakers.

The syncope rule is no longer applied to nouns ending in n/ñ in younger speech. Aŋun becomes aŋuti and aŋunmik becomes aŋutimik. Whereas older speakers generally prefer syncopated forms, they more readily accept unsyncopated forms which normally exhibit the ñ/sĭ alternation. Kakkiñ 'safety pin' is most often kakkisi at all levels of Barrow speech. As the rule is being lost, ñ/sĭ represents a less productive alternation than n/tĭ and is naturally the first to fall into disuse.

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17. Greenlandic aRnaq has the additional meaning 'mother'.

In fact, it is probably the case that all productive applications of the syncope rule are suppressed in innovative speech. Atqiñ (atïq + -iñ) 'your name' becomes atin and atqa (atïq + -a) 'his name' becomes atiŋa. Kamŋiñ (kamïk + -iñ) 'your boot' and kamŋa (kamïk + -a) 'his boot' become kamin and kamiŋa respectively. These restructurings have the effect of eliminating syncope, although the change may be due most directly to simplification of the possessive inflection system, so that these morphemes simply cause truncation of a stem-final C. This question is taken up in Section 5.331.

In the Kobuk dialect we note at least one case of restructuring to eliminate Ï-deletion. The word for 'burrow, den' is given alternately as sisï(g) or siñ with the latter judged to be an older form. The plural sisit and the terminalis siţmun 'to the den' show that the Ï/Ø alternation still is preserved in some forms, although the competing form sisimun is also found in the terminalis case.

If it is correct that the older singular form siñ is being replaced by the allomorph sisi(g), it is more than failure of the syncope process which is responsible. Stems of a single vowel mora are rare in Inupiaq. Most of those that exist are verb stems -- e.g. put- 'bend over', it- 'be', etc. -- which are dependent morphemes. Almost no monosyllabic independent morphemes, i.e. noun stems, exist

in the language, which may account for the tendency toward restructuring of this form.

4.54 A phonological treatment of syncope

In conclusion of this section the question of how to account for I-deletion phenomena in terms of rules will be discussed. We have presented the hypothesis that syncope was originally a unified and productive phonological process in Inupiaq, although only sporadic occurrences of it remain. At the synchronic level it is no longer clear that we are dealing with a single process, and the syncope phenomena which exist may be best accounted for by more than one rule, as argued in Section 2.5.

Cases of syncope can be divided, essentially, into two types: the fairly productive deletion of penultimate I and the highly irregular deletion of morpheme-final I.

Penultimate I which precedes a velar or uvular is regularly subject to syncope when followed by a vowel-initial suffix, provided that syncope does not create a cluster of more than two consonants. There are no penultimate I's which cannot be syncopated under these conditions. Not all vowel-initial suffixes will trigger syncope, however, and those which do not must be so marked.

Rule 11 Syncope of penultimate I

$$I \rightarrow \emptyset / VC__ \begin{Bmatrix} k \\ q \end{Bmatrix} + V$$

This rule accounts for alternations of the sort found in

tupiq vs. tupqich.

Morpheme-final deletion of ĭ is not nearly so regular as deletion of penultimate ĭ. To recapitulate what was demonstrated on this point: 1) only some stems contain final ĭ's which are subject to deletion: /aŋutĭ/ does, inĭ does not; 2) only some suffixes trigger deletion of final ĭ: -mun does (B aŋunmun/K aŋutmun), -nun does not (aŋutinun); 3) a series of forms demonstrates sporadic applications of the syncope rule. The stem tumĭ 'track, path' is related to the forms tuvli- (tumĭ + -li-) 'make a track' and tuvsi- (tumĭ + -si-) 'find tracks', yet syncope does not apply in other expected environments with the same stem: tumimun, not *tummun term sg (tumĭ + -mun). Similarly, the stems qupĭ- and ikĭ- do not regularly undergo syncope, although the related forms qumniq and igniq are found.

The more productive instances of morpheme-final syncope are found in noun stems which end in tĭ or its assibilated equivalent sĭ, e.g. /aŋutĭ-/, /kakkisĭ-/, etc. These final ĭ's are regularly subject to deletion as described above and can be deleted by morphological rule when followed by a suffix marked to trigger their deletion. Apparently, those ĭ's which delete must also bear a special marking to that effect, since there exist final tĭ sequences which do not undergo syncope, e.g. aqpatĭ 'runner'.

This difference in behavior of final tĭ's as regards syncope is due to a difference in the morphemes in-

volved. The tï morpheme where syncope may not apply is an agentive nominalizer whereas the -(u)t(Ï) which undergoes syncope is an instrumental nominalizer synchronically. The two may be related historically, and the instrumental is probably older since derivations of instrumentals are often opaque (e.g. aiṭqan 'mitten', akiñ 'pillow') whereas agentive derivations are all transparent. In any case these two suffixes are certainly separate synchronically.

Morpheme-final Ï deletion in cases (1) and (2) as described above can then be handled only by marking both final Ï's and suffixes as to whether they undergo or trigger syncope, respectively. Only when a specially marked Ï is followed by a marked suffix will syncope occur, indicating that these cases are lexicalized. Forms of the third type must be considered lexicalizations as well since they cannot be derived by the morphological rule of syncope, e.g. tuvli- and tuvsi- from the stem tumï.

Those Ï's marked for syncope also undergo apocope word finally -- /aŋutÏ/ ⟶ /aŋut/ -- and the final C is nasalized -- /aŋut/ ⟶ aŋun. The nasalization rule must apply only to words ending in VtÏ, so that the plural morpheme -t is excepted. To avoid including a derivational constraint on the rule saying that t becomes n only when a final Ï has been deleted, we include a condition that the rule applies only to singular nouns.

Rule 5 gives aŋun 'man' from /aŋutÏ/ as well as

aŋutin 'your man' from /aŋutïtï/, where the final tï is the 2s poss morpheme found in aŋutitin 'your men'. In addition, aqpatï 'runner' must not undergo Rule 5, even though it appears to satisfy the condition stated above. Underlyingly /aqpat + tï/ ('run' + agent), this and related forms are generated correctly if nasalization is ordered subsequent to the degemination process discussed in Section 5.4 which gives aqpati.

The tï/n alternation is productive as demonstrated by two loan words. B paluun 'balloon' has the dual paluutik and the plural paluutit. K kayuun 'coyote' is apparently derived from underlying /kayuutï/, the form which was borrowed from English, by applications of apocope and stem-final nasalization. We thus restate Rule 5:

Rule 5

$$\begin{bmatrix} C \\ +\text{coronal} \\ -\text{continuant} \end{bmatrix} \longrightarrow \begin{bmatrix} +\text{nasal} \\ +\text{continuant} \end{bmatrix} / ___\# \quad \text{in singular nouns}$$

4.6 Minor vowel alternations

Inupiaq has several minor vowel alternations which occur in highly restricted environments. These will be briefly mentioned here and in some cases, where the alternation is an integral part of some morphological process, taken up in succeeding chapters.

4.61 The u/Ø alternation

Alternation between u and zero is found with the relative case marker -m which is sometimes preceded by u:

(83)

	Absolutive case	Relative case	
	anuġi	anuġim	'wind'
	ulu	ulum	'woman's knife'
	qayaq	qayyam	'canoe'
	amiq	ammim	'skin'
but	savik	savium	'knife'
	iñuk	iñuum	'person'
	kamĪk	kamŋum	'boot'
	aġviĪq	aġviġum	'whale'

Other morphemes such as the instrumental nominalizer -utĪ and the verbal suffix -utĪ- meaning 'do with or for' also exhibit the u/Ø alternation; here the zero alternant occurs with vowel-ending stems.

(84)

Verb stem		Instrumental
iga-	'cook'	iggan
kaki-	'prick'	kakkiñ
imĪq-	'drink'	imġun
amiq-	'skin'	amiun
aglak-	'write'	aglaun

The verbal -utĪ- suffix is found in iggatigaa /iga + (u)tĪ + kaa/ 'cooks for him' and aglautigaa /aglak + (u)tĪ + kaa/ 'writes for him', showing the appearance of a suffixal u with consonant-ending stems.

Within these paradigms is found the interaction of major phonological processes of the language, including gemination, syncope, and vowel alternation. Only when each of these processes has been presented thoroughly can the relationship between them be discussed, and at that time the u/Ø alternation will be taken up again (see 6.213).

4.62 The i/Ø alternation

Alternation between /i/ and Ø is found in absolu-

tive plural nouns and singular nouns inflected for a second person singular possessor:

(85)

Absolutive sing.	plural	2s poss	
ulu	ulut	ulun	'woman's knife'
qayaq	qayyat	qayyan	'canoe'
amiq	ammich	ammiñ	'skin'
savik	saviich	saviiñ	'knife'
qanïq	qanġich	qanġiñ	'mouth'
kamïk	kamŋich	kamŋiñ	'boot'

The plural and possessed forms given above are distinguished only by nasalization of the final consonant. In many Inupiaq dialects, including Point Barrow and West Greenlandic, nasalization is either non-existent or non-distinctive word-finally and syncretism of the absolutive plural and second person singular possessive form results.

In these examples, i alternates with zero in the same cases where u did so in relative case singular forms. The similarities between the two systems will be discussed in Section 6.213.

4.7 Distinguishing i from ï phonologically

Besides elucidating the nature of vowel alternations in Inupiaq, the preceding sections serve to demonstrate further the need for a synchronic distinction between two varieties of i or some other means of accounting for processes which are otherwise unmotivated. If such a distinction is not made, vowel alternation and palatalization cannot be accounted for by rule. This alternative seems undesirable since the regularity with which these processes

occur -- especially palatalization -- indicates that they are productive alternations of the language.

An abstract solution to this problem involves positing an underlying four vowel system, as done by Underhill (1976), including /ɪ̄/. The full consequence of this approach is that /ɪ̄/ must bear an independent specification in terms of distinctive features, which of course entail actual phonetic correlates. Motivation of various alternations of the language which depend on the i/ɪ̄ contrast can then be ascribed to differing phonological aspects of the two underlying segments. The high front vowel /i/ causes palatalization while the non-high /ɪ̄/ does not; /ɪ̄/, on the other hand, is a mid unrounded vowel similar to schwa which alternates with other vowels and undergoes deletion. Such phonological behavior appears universally characteristic of schwa. An underlying fourth vowel thus gives the alternations in question a natural phonological motivation which they will not have in any other solution. Finally, a rule of absolute neutralization takes all /ɪ̄/ to [i] yielding a surface phonetic three vowel system.

A constrained version of abstract theory which incorporates Kiparsky's (1968) Weak Alternation Condition would permit absolute neutralization in the case we describe, since a number of rules depend upon the diacritic use of phonological features. A concrete perspective of the problem would certainly raise many objections to this type of analysis, however.

Natural phonologists, like Hooper (1976), generally accept Kiparsky's original Strong Alternation Condition, which prohibits all use of phonological features as diacritics and thus all cases of absolute neutralization. Such a constraint eliminates the solution we describe for Inupiaq as a possibility. Why should the alternations in question be described as phonetically natural when they are not so on the surface? The truth is that there exist high front vowels which fail to trigger palatalization and do undergo alternation. This fact should be expressed in the grammar rather than calling high front vowels which do not behave "naturally" something else underlyingly. In the estimation of a natural phonologist, the abstract four vowel system which would have to be posited underlyingly and the consequent rule of absolute neutralization are really nothing more than a recapitulation of an historical development in the language which has no place in a synchronic grammar.

We have pointed out before that correspondences between synchronic and diachronic Eskimo vowel systems are less than perfect, cf. CY neRe- and AI nĭġi- (not *nĭġĭ-) 'eat' or CY t^{s}etuaq and AI sisuaq (with assibilation of t following /i/) 'beluga'. This fact is small consolation, however, to those who recognize the putative underlying four vowel system as essentially an historical solution to a synchronic problem.

A solution acceptable to natural phonologists would

apparently have to distinguish between the two i's with a diacritic, which would effectively handle the problem. Two processes, however, palatalization and vowel alternation (in general), depend on whatever device is used to separate i from ĭ. Either one diacritic could be used to encompass two unrelated processes or ĭ's would have to bear two diacritics each, one [- PALATALIZATION] and the other [+ VOWEL ALTERNATION]. While the data are accounted for with the diacritics triggering -- or not -- the appropriate rules, this solution misses any relationship which might be expressed between the failure of an i to cause palatalization and its ability to alternate with other vowels. The strength of the abstract analysis is that it does capture this relationship, although it attributes it to a questionable underlying distinction.

A disadvantage of the concrete solution arises when the tenets of Natural Phonology are interpreted strictly. Marking some i's with a diacritic still distinguishes two types of i when only one i is present on the surface. Moreover, when we observe alternation between a palatal and an alveolar consonant, as in natchiġñun 'to the seals' versus aiviġnun 'to the walruses', why should we attribute the presence or absence of a palatal to the nature of the preceding i if our interest is only with surface forms? If the abstract solution appears historical in nature, the i-marking solution seems to be a synchronic solution based upon an historical insight, i.e. that there were two types of i.

Hooper generally uses diacritics to indicate properties of stems rather than of individual segments. If Inupiaq stems were marked plus or minus Palatalization, however, stems containing two i's could not be accounted for. For example, in niqi 'food', both vowels must somehow be marked, cf. niqinik 'food' mod pl and B niqłiqsuq 'prepares food'. Marking stems for vowel alternation would encounter similar problems.

Choosing between solutions is not simple in light of the advantages and disadvantages we have pointed out for each. Whereas the problems with analyses involving absolute neutralization are well known, it seems that in this case the concrete alternatives are not especially pleasing either. We consider it out of the question to deny the productivity of Inupiaq affixation and list infinite series of lexicalizations, so that the alternations we discuss are not alternations at all. Serious difficulties are entailed by marking stems. The best concrete analysis will depend on all occurrences of I being marked by a double diacritic, a solution which is functional but not particularly elegant.

4.8 Long vowels, vowel clusters, and diphthongs

All Inupiaq vowels may occur short or long, except for I which is always short. The long vowels, written double, are aa, ii, and uu. In addition, two short vowels may occur together, producing a vowel cluster or diphthong which is equivalent in length to a long vowel. Possible

vowel clusters are ia, ua, iu, and ui, while ai and au are phonetically the diphthongs [ay] and [aw], although their value may vary as explained below.

4.81 Analysis

Nearly all long vowels and vowel clusters are analyzable as arising from the joining of two short vowels in one of the following two ways:

1. Through affixation, often with consequent deletion of a morpheme-final consonant:

(86) nuna + -iṭ- + -tuq ⟶ nunaitchuq
'land' 'not have' 3s 'he has no land'

ulu + -a ⟶ ulua
'woman's knife' 3s poss 'her knife'

iñuk + -ich ⟶ iñuich
'person' pl 'people'

savik + -iñ ⟶ saviiñ
'knife' 2s poss 'your knife'

2. Through deletion of an intervocalic consonant morpheme-internally:

(87) /pagi/ ⟶ pai- 'to stay behind'

/puguq/ ⟶ puuq 'sack, poke'

/quřaq/ ⟶ quaq 'raw frozen meat or fish'

The process of consonant deletion which applies here is taken up under the heading of Consonant Alternation, Chapter V. At this point, suffice it to say that certain inflected forms of the above stems demonstrate the existence of an intervocalic consonant whose deletion creates a long vowel or vowel cluster.

Some diphthongs are not analyzable synchronically as a sequence of separate vowels, for example qauq 'forehead' and -piaq 'real'. Although cross-linguistic information indicates that 'forehead' had an original VCV sequence (cf. SLI qaguq), there is no reason to believe this to be the case synchronically. Similarly, it is probable that -piaq is related morphologically to -pik also meaning 'real', in which case the diphthong in question must be a sequence of i plus a with a lost intervocalic consonant.

Whereas the majority of vowel clusters are synchronically demonstrable sequences of two short vowels, there is nothing in the behavior of others to distinguish them or suggest another analysis. Moreover, these other cases are usually known to be derived from historical vowel sequences, cf. qauq 'forehead' and SLI qaguq.

Long vowels, on the other hand, generally arise like diphthongs in one of the ways described above, although a small minority result from the process of vowel lengthening, which is not widely found yet occurs consistently in vocative forms and sometimes in dual nouns:

(88) Vocatives:

	iġñiq ⟶	iġñiiq!	'son!'
	panik ⟶	paniik!	'daughter!'
	kayuqtuq ⟶	kayuqtuuq!	'red fox!'

(89) Duals:

	niksik ⟶	niksiik	'fish hooks$_2$'
	mannik ⟶	manniik	'eggs$_2$'
B	aviŋŋaq ⟶	aviŋŋaak	'lemmings$_2$'
K	aviññaq ⟶	aviññaak	'lemmings$_2$'

natchiq ⟶ natchiik 'seals$_2$'
killuq ⟶ killuuk 'errors$_2$'

In these cases we posit a vowel lengthening process, since there is no reason to assume a suffix-initial or epenthetic vowel which would somehow assimilate to an adjacent stem vowel.

4.82 Vowel "leveling" in Kobuk

Whereas most Inupiaq dialects have six distinct vowel clusters (including two diphthongs) -- ai, ia, iu, ui, au, ua -- the Kobuk dialects have only one phonetic vowel cluster, ui. The others have undergone so-called "leveling" so that they are phonetically long vowels; in two cases clusters have merged, so as to become phonetically indistinguishable from each other.

Table 3.

/ai/
/ia/ > [e:]

/au/
/ua/ > [o:]

/iu/ ⟶ [i:] (identical with ii)

/ui/ ⟶ [ui]

The representation of these sounds in the standard orthography of Inupiaq was in the past a source of discussion, with one position arguing for representation of underlying vowel clusters and another proposing not to distinguish orthographically between varieties of one phonetic entity. In the end it was decided that the standard

orthography for Kobuk should include six vowel clusters. Besides the interest in maintaining a uniform Inupiaq writing system throughout Alaska, this decision was based on considerations of phonology and morphology.

The forms panai 'his spears' and pania 'his daughter' are both [pane:] in Kobuk, so that the orthographic representations are an abstraction based on other than phonetic information. The justification for distinguishing ia from ai in this case depends upon morphological segmentation of the forms:

(90)

pana 'spear'	+	-i 3s-3p poss	⟶	panai 'his spears'
panik 'daughter'	+	-ə 3ə-3s poss	⟶	pania 'his daughter'

When vowel clusters and long vowels arise through affixation, their underlying form can be discovered provided that a given cluster can be shown to result from a sequence of two independent vowels. Then, diphthong leveling can be attributed to a late phonetic rule which operates on vowel sequences.

Other examples of vowel clusters created by affixation and subject to leveling are the following:

(91)

savik 'knife'	+	-u- cop	+	-tuq 3s int	⟶	saviuruq [savi:ruq] 'it is a knife'
aġnaq 'woman'	+	-u-	+	-tuq	⟶	aġnauruq [aġno:ruq] 'it is a woman'
aviññaq 'lemming'	+	-ich pl			⟶	aviññaich [aviññe:č] 'lemmings'

niaquq + -a ⟶ niaqua [ne:qo:]
'head' 3s-3s poss 'his head'

(Both orthographic and phonetic representations are given for each form.)

Some vowel clusters are created through the deletion of an intervocalic consonant as described above. Whereas pai- [pe:] 'stay behind' is indistinguishable from the sequence pia in isolation, the allomorph /pagi-/, found with a geminate in the imperative paggiiñ 'stay behind!' indicates that the source of [e:] is the diphthong ai.

Moreover, palatalization phenomena often indicate the underlying nature of a vowel. The palatalization rule as written causes an alveolar C to become palatalized when the preceding vowel is /i/. If another vowel intervenes, the rule does not apply. Therefore, ai + n ⟶ aiñ, but ia + n ⟶ ian. The form qipmian [qipme:n] 'his dog' rel must contain the vowel cluster ia because palatalization fails to apply to give [*qipme:ñ]. Segmentation of this form as /qipmiq + an/ substantiates this claim.

The -piaq morpheme [pe:q] meaning 'real', as in iñupiaq (iñuk 'person' + -piaq 'real') 'Eskimo', is not segmentable, however, and only the plural form -piat [pe:t], as in iñupiat 'Eskimos', indicates the underlying vowel sequence by lack of palatalization of the final t. Evidence from dialects which distinguish phonetically between ia and ai, such as Barrow, confirms -piaq as the correct form.

Nunamiu [nunami:] 'inland dweller' and sii [si:] 'sheefish' have final vowels which are indistinguishable from each other. However, their plurals, nunamiut [nunami:t] and siich [si:č], indicate that the latter contains /i:/ which triggers palatalization, while the former contains /iu/.

In cases where morphological or phonological processes do not indicate which cluster underlies a phonetic long vowel, the standard orthography finds no reason for choosing one representation over another phonetically equivalent one. Then cross-dialectal information is relied upon to point out the appropriate vowel sequence. Forms such as qauq 'forehead' and niaquq 'head' fall into this category, since no evidence from within the Kobuk dialect gives reason to prefer the above spellings to *quaq and *naiquq.

The word for 'forehead' is in fact homophonous with the word for 'frozen meat or fish' in Kobuk, both being [qo:q]. The latter has the plural qurrat which identifies the underlying vowel cluster in the singular form as ua, giving the spelling quaq for 'frozen meat or fish'. 'Forehead' has no allomorph which reveals its underlying diphthong, and so the orthography must rely upon cross-dialectal information to furnish the spelling qauq.

In this work we adhere to the orthographic convention of representing phonetic long vowels in terms of the

vowel clusters which underlie them wnere appropriate. The writing system misses no crucial information in its representation of the language and any problem which exists is due to an overdifferentiation among sounds. While this principle introduces some degree of abstractness into what are claimed as surface representations, that abstractness is really fairly minor. Leveling must be viewed as a low level phonetic rule insofar as it interacts with none of the other phonological or morphological processes of the language.

4.83 Avoidance of coalescence among forms containing vowel clusters and restructuring

There are surprisingly few cases where loss in distinctness among vowel clusters results in otherwise distinct utterances becoming homophonous. On the basis of forms found in other dialects which lack leveling, one would expect ambiguity in Kobuk cognates, such as that found in qauq 'forehead' and quaq 'frozen meat or fish' which are homophonous.

Barrow qai- 'come' and qia- 'cry' could not be distinct in Kobuk as would be the case similarly with Barrow kii- 'bite' and kiu- 'answer'. In both instances Kobuk seems to avoid the problem. The stem qai- is suppressed in Kobuk and replaced by aggiq-; qia- is retained for 'cry'. The existence of qai- historically, however, is attested by

the Kobuk imperative qaġġaiñ! 'come!'. 'Bite' in Kobuk is kigi- retaining the intervocalic g which is deleted in other dialects. 'Answer' then is kiu- [ki:].

As might be expected, reanalysis sometimes takes place in vowel clusters. If a phonetic long vowel has two clusters as possible sources, speakers may restructure underlying representations from one cluster to the other. Restructuring is verifiable in cases where [e:] can be "tested" for whether it triggers palatalization, i.e. /ai/ does, /ia/ does not. The Barrow word for 'mountain sheep' is imnaiq, related to imnaq 'cliff'. Its Kobuk cognate is [ipne:q], and for many speakers the plural is [ipne:t] rather than [ipne:č]. The lack of palatalization in the plural indicates that many speakers take the [e:] to be /ia/ underlyingly, restructured from the original ipnaiq. Similarly, Barrow sialġi- 'to slide' is cognate with Kobuk [se:ʌʁi], an apparent case of restructuring to sailġi-.

The Kobuk dialect contains rare examples of unleveled diphthongs, which the orthography does not distinguish from others. The imperative qaġġaiñ 'come!' is phonetically [qaʁ:ayñ]. As mentioned earlier, this form is not regularly derived from the stem qai- 'come' but exists in isolation as an archaism, which probably has allowed it to retain the unleveled ai diphthong. Similarly, apai! 'enough!' is [apay] and not [*ape:] as the leveling process would predict. Other Inupiaq exclamations have been found

to be irregular as well (see 1.22).

Leveled vowels are becoming increasingly more common throughout Inupiaq, although nowhere is the process as complete as in Kobuk. It is common, for instance, for a dialect to level one vowel cluster of a pair but not the other, so that a contrast is preserved. Another Malemiut dialect similar to that of the Kobuk is found in the village of Deering, where, for example, qauq 'forehead' is [qo:q] but quaq 'frozen meat or fish' is [qɔaq], maintaining a distinction which has been lost in Kobuk speech.[18]

In Barrow the [e:] pronunciation of /ai/ is often heard, especially after initial t, for some reason. Thus, taimma 'at that time, past' is often [te:m:a] rather than [taym:a], and taigruaq 'oil drum' is commonly [te:ɣřuaq]. Other instances of ai as in airuq 'he goes home' and qairuq 'he comes' are normally never anything but [ay] in Barrow.

An example of restructuring in Barrow vowels is found in the forms kaimit- 'push off a boat', kaivaluk- 'go in a circle' and other forms with initial kai- which are often heard and written as kiamit-, kiavaluk-, etc. In kaivɬuun 'sled stanchion' the palatal ɬ is retained even

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18. In the Kobuk villages and Selawik, vowel cluster leveling appears to be complete in the way described by Table 3. Many other dialects have leveled some vowel clusters, but not others, so that no loss of distinctness results. The most common situation is for the diphthongs au and ai to become [o:] and [e:] respectively, with the four other vowel clusters retaining distinct values which generally vary slightly from one village to the next. Some degree of idiolectal variation is also found.

in the restructured form [kiavʌu:n] where an ia diphthong would not normally cause palatalization of a succeeding consonant. Possibly the only group of Barrow speakers who show no leveling or restructuring whatever are those from Point Barrow, which has one of the Alaskan Inupiaq dialects in which all diphthongs are given their "full" value.

CHAPTER V: Consonant Alternation

5.1 Introduction

The most frequently occurring and regular consonant alternations in Inupiaq are those which result from the assimilation and palatalization processes as they have been described in earlier chapters. There exist in addition a number of other consonant alternations conditioned by morphological processes; the possibilities for alternation are stop-zero, stop-continuant, and continuant-zero. Consonants may alternate frequently in their manner of articulation but almost never in their place of articulation. Alternation with respect to place of articulation is random and extremely rare and will not be taken up here.

Rischel (1974:241) cites stop-continuant and continuant-zero as the "two important types of alternation" for Greenlandic, and he treats these in detail. The same statement can be made of Alaskan Inupiaq, and most of our discussion will concern these two types of alternation. Stop-zero alternation occurs frequently and cannot be considered unimportant; however, it is almost always due to morphological processes such as truncation caused by suffixation and devoid of apparent phonological conditioning

(see 5.4). For instance, the suffix -piaq causes truncation of the final consonant of a stem to which it is added. With a noun stem, it means 'real' as in iñupiaq 'Eskimo, lit. real person' from /iñuk + piaq/. Added to a verb stem, -piaq- has the meaning 'really do' as in siñipiaq- 'really sleep' from /siñik + piaq/.

Another morpheme -piaq- causes retention of a preceding consonant, attaches to verb stems only and means 'be liable to do' as in siñikpiaqtuq (siñik- 'sleep' + -piaq- 'liable' + -tuq 3s int) 'he is liable to be sleeping'. There are thus at least two morphemes with the shape -piaq, differing both in meaning and in the manner in which they are suffixed.

As in the case of -piaq, suffixes are typically unpredictable as to their behavior upon affixation at least with respect to phonological conditioning. Many morphemes in the language thus must bear special markings to indicate this behavior. The majority of morpheme-final consonant deletions in the language result from morphological processes of this sort, making them less interesting than other alternations for a synchronic phonological description.[1] Final consonants which are deleted by phonological rule were discussed in Section 2.31 when Rule 4, Cluster Simplification, was presented. This chapter then will

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1. In Section 5.4 is found a discussion of truncating and non-truncating type suffixes from an historical point of view.

concentrate on the stop-continuant and continuant-zero alternations.

5.2 Alternations of stops with continuants

Alternations between stops and continuants are very much in evidence throughout Inupiaq, although not all such alternations depend on synchronic phonological or morphophonemic processes. Forms such as niqi 'meat' and niġi- 'eat' or iki- 'burn' and iga- 'cook' are doubtless related, although their relationship cannot be accounted for within the synchronic phonological system of Inupiaq.

5.21 Types of alternation

In a number of situations, regular alternations between stops and continuants are found which can be accounted for by rule. These alternations are of two principal types.

1) A stem-final stop alternates with a voiced fricative when intervocalic:

(92)

	aġviq	'whale'
	aġviġich	plural
	aġviġum	relative case
B	punniq	'bread'
	punniġich	plural
	punniġum	relative case
	siksrik	'ground squirrel'
	siksrigich	plural
	siksrigum	relative case
	iġñiq	'son'
	iġñiġiñ	'your son'
	amiq	'skin'
	amiġiksuq	'it is a nice skin'

savik 'knife'
saviġiksuq 'it is a nice knife'

2) A stem-internal fricative may alternate with a long homorganic stop in the environment of a suffix which conditions gemination:

(93)

	putuguq	'big toe'
	putukkuk	dual
B	qiḷalugaq	'beluga whale'
	qiḷalukkak	dual
	qiḷalukkat	plural
	amaġuq	'wolf'
	amaqquk	dual
	amaqqut	plural
	tunmiġaq	'a stair step'
	tunmiqqak	dual
	tunmiqqat	plural
B	iqaġĩ-	'wash'
	iqaqqun	'soap'
	iqaqqivik	'wash basin'
	apiġĩ-	'ask'
	apiqqun	'a question'
	tulugaq	'raven'
	tulukkak	dual
	tulukkat	plural
	isigak	'foot'
	isikkak	dual

The type of alternation found in (92) above is reasonably straightforward in that a voiced fricative is a likely intervocalic alternant of a stop with the former derived from the latter by a process of lenition. The exact nature of the lenition rule will be considered following a complete discussion of the relevant data, so that the most general rule possible may be written.

While the alternation in (92) appears due to final

versus intervocalic position of the consonant in question, that in (93) results rather from the process of gemination. Since the nature of this process is taken up in Chapter VI, suffice it to say here that Inupiaq has a category of suffixes which cause gemination of a preceding single medial consonant. As in the examples of (93), the dual and plural morphemes regularly condition gemination in the majority of q-final stems (see 6.2):

(94)

amiq	'skin'
ammik	dual
ammich	plural
aaqhaaliq	'oldsquaw duck'
aaqhaallik	dual
aaqhaallich	plural
nanuq	'polar bear'
nannuk	dual
nannut	plural

When a medial long consonant or cluster precedes a suffix which conditions gemination, there is no change within the stem since gemination cannot apply:

(95)

qimmiq	'dog'
qimmik	dual
qimmich	plural
aġnaq	'woman'
aġnak	dual
aġnat	plural

A complete discussion of the formation of dual and plural nouns is found in Section 6.2.

5.22 Analysis

The forms in (93) do not manifest "gemination" as

it is found elsewhere in the language, e.g. amiq/ammik 'skin, sg. and dual', but the alternation between single and geminate consonants in the environment where gemination is expected to apply makes alternations in (93) suggest an elaborated instance of the gemination process.

If forms such as putuguq and putukkuk 'big toe, sg. and dual' are assumed to be related by means of productive phonological rules, some measure of abstractness will need to be introduced into our underlying representations. Underlyingly, 'big toe' will be /putukuq/ and 'wolf', /amaquq/. The singular forms of these nouns can then be derived by means of the intervocalic stop lenition rule which we have proposed to relate forms in (92). The duals and plurals of nouns like 'big toe' and 'wolf' can be arrived at by applying gemination to the underlying forms, just as with other nouns.

5.23 Lenition

To explicate further the derivation of forms in (93) from underlying representations like /putukuq/ 'big toe' and /amaquq/ 'wolf', it will be necessary to investigate the rule of lenition which derives the singular nouns putuguq and amaġuq. Ideally one lenition rule should function in both (92) and (93) above, yielding intervocalic voiced fricatives in both aġviġich 'whales' from /aġviq + ich/ and putuguq 'big toe' from /putukuq/. Clearly, single intervocalic velar stops do exist in the language -- e.g. siku 'ice', siqi-

'splash', etc. -- so that the lenition process must be restricted in its application.

As observed by Tor Ulving for West Greenlandic (1953:49) the "position between the first two syllables of the word...must be characterized by factors tending to preserve the original nature of the consonant." In other words lenition will not apply in cases like siku and siqi-. It is following the second and later syllables of the word that lenition does apply as revealed by the forms of (93). As Rischel has done for West Greenlandic (1974: 245-247) we revise Ulving's observation for Alaskan Inupiaq to say that stops which follow the first vowel mora of a stem remain intact, while stops following the second and later vowel morae are subject to lenition. Our revision thus accounts for lenition following an initial long vowel or diphthong as in kuuġuq/kuuqqut 'furrow, sg. and pl.' and quaġaq/quaqqat 'sour dock, sg. and pl.'.

Our characterization of lenition is still imperfect at this point inasmuch as there exist single intervocalic stops which follow other than the first vowel mora of the stem.

(96)

irī	+ -kit-	+ -tuq	⟶	irikitchuq
'eye'	'have a small NOUN'	3s int		'he has small eyes'
niġi	+ -piaq-	+ -tuq	⟶	niġipiaqtuq
'eat'	'really'	3s int		'he is really eating'
niqi	+ -tuq-	+ -tuŋa	⟶	niqituqtuŋa
'meat'	'eat'	1s int		'I am eating meat'

puuq	+	-ku	⟶	puuku
'sack'		'extra'		'disused sack'
inĭ	+	-ka	⟶	inika
'place'		1s-3d poss		'my two places'

All of these forms are synchronically opaque with regard to the lenition rule and must be marked in some way as exceptional. In Section 5.4, we include a discussion of the historical situation which may have given rise to these opaque forms. Since there is no synchronic phonological basis for distinguishing between two types of stops, one that may lenite and one that may not, we will say here only that some stops must be marked as not undergoing lenition.

The lenition rule may now be written to apply in forms such as those in (92) and (93) above:

Rule 12 Lenition

$$\begin{bmatrix} C \\ -\text{continuant} \end{bmatrix} \rightarrow \begin{bmatrix} +\text{continuant} \\ +\text{voice} \end{bmatrix} / VC_oV____V$$

The structural description of the rule prevents it from applying after the first vowel mora of the word.

The validity of the lenition process has been established for forms in (92) and (93) above, and it can be used in fact to explain many other stop-continuant alternations as well.

(97)	siñik-	+	-pa	⟶	siñikpa
p/v:	'sleep'		3s int inter		'is he sleeping?'
	imiq-	+	-pa	⟶	imiqpa
	'drink'				'is he drinking?'

B aqpat- 'run' + -pa → aqpatpa 'is he running?'

niġi- 'eat' + -pa → niġiva 'is he eating?'

siñik- 'sleep' + -palliq- 'probably' + -tuq 3s int → siñikpalliqsuq 'he is probably sleeping'

imiq- 'drink' + -palliq- + -tuq → imiqpalliqsuq 'he is probably drinking'

B aqpat- 'run' + -palliq- + -tuq → aqpatpalliqsuq 'he is probably running'

niġi- + -palliq- + -tuq → niġivalliqsuq 'he is probably eating'

(98) k/g:

tautuk- 'see' + -kaa 3s-3s tr → tautukkaa 'he sees it'

imiq- 'drink' + -kaa → imiġaa[2] 'he drinks it'

tuqut- 'kill' + -kaa → tuqutkaa 'he kills it'

niġi- 'eat' + -kaa → niġigaa 'he eats it'

tautuk- 'see' + -kaluaq- 'although' + -tuq 3s int → tautukkaluaqtuq 'although he sees'

imiq- 'drink' + -kaluaq- + -tuq → imiġaluaqtuq 'although he drinks'

B aqpat- 'run' + -kaluaq- + -tuq → aqpatkaluaqtuq 'although he runs'

niġi- 'eat' + -kaluaq- + -tuq → niġigaluaqtuq 'although he eats'

---

2. When a velar-initial morpheme of the non-truncating type is suffixed to a uvular-final stem, the velar is dropped and the intervocalic uvular lenites, in satisfaction of the prohibition on velar-uvular clusters.

(99) t/ř:	tautuk- 'see'	+	-tuq 3s int	→	tautuktuq 'he sees'
	imiq- 'drink'	+	-tuq	→	imiqtuq 'he drinks'
B	aqpat- 'run'	+	-tuq	→	aqpattuq 'he runs'
	niġi- 'eat'	+	-tuq	→	niġiruq 'he eats'
	qimak- 'flee'	+	-taq passive nominal	→	qimaktaq 'something fled from'
	imiq- 'drink'	+	-taq	→	imiqtaq 'something drunk'
	tuqut- 'kill'	+	-taq	→	tuqutaq [3] 'something killed'
	niġi- 'eat'	+	-taq	→	niġiraq 'something eaten'

The cases of lenition in Inupiaq are numerous, and yet it is not clear that all of them should be accounted for synchronically by means of the lenition rule. Forms in (92) and (97)-(99) where single stops alternate regularly with continuants are certainly the most straightforward examples of lenition and can be handled easily by rule; but forms of (96), which contain unlenited single stops, require some indication of their exceptional status.

In terms of synchronic reality, we can characterize three types of lenition. In the first case, lenition is verifiable historically although not recoverable within modern Inupiaq, e.g. I -tuqut is equivalent to CY -tukut

3. The anticipated long consonant which would result from suffixation here is degeminated by a process discussed in Section 5.4.

lp int, yet the stop, which is certainly the older form, never appears in Inupiaq. Secondly, lenition may be partly recoverable, as in putuguq/putukkuk where lenition supplies a possible synchronic explanation for the consonant alternation, and cross-linguistic evidence affirms the diachronic reality of lenition here. Thirdly, lenition accounts for a productive alternation, as in aġviq/aġviġich 'whales, sg. and pl.'. The only really problematical case is the second one which seems to lie between synchrony and diachrony, since some approaches to phonology would have to disallow the use of the lenition rule in these forms. Certainly, the choice here depends upon the goals of one's phonology.

5.24 Alternation involving s and y

Another case of stop-continuant alternation is found when single intervocalic s or y is geminated:

(100)

	isiq	'smoke'
	itchich	plural
	itchimik	modalis case, singular
	isĪk	'caribou toe skin'
	itchak	dual
	utkusik	'cooking pot'
	utkutchik	dual
	utkutchiuq-	'to make a cooking pot'
	tasiq	'lake, lagoon'
	tatchich	plural
B	asiq	'sleeve'
	atchik	dual
B	sisu-	'to slide'
	sitchuiñ	'slide!' (2s)

(101)

nuyaq or B nusaq	'hair'
nutchat	plural
puyuq	'smoke'
putchut	plural
qayuq	'broth'
qatchiuq-	'to make broth'

but

(102)

qayaq	'canoe'
qayyat	plural
qayyi-	'to make a canoe'
ayak	'pole'
ayyak	dual
aqaya	'mud'
aqayyiqi-	'to play with mud'
tayaq	'bracelet'
tayyat	plural
quya-	'to thank'
quyyan	'thanks'

The data cited here demonstrate that s alternates with [č:] (orthographic ⟨tch⟩) in environments where gemination is normally found, i.e. noun duals and plurals and certain other forms bearing a suffix. In fact [s:] does not exist in North Alaskan Inupiaq[4], and when s alternates with a long consonant, it is always [č:]. This alternation is not limited in terms of where within the word it may occur except by considerations of where long consonants may be found. In this respect the s/č: alternation is unlike the other obstruent-continuant alternations, which are never found following the first vowel mora of the word.

4. Innovative forms with [s:] are found as well as loan words such as K sassaq 'clock, hour' from Russian [čćsi].

As pointed out in Section 3.24, s can be argued not to be an underlying segment of the language since it can be derived in all cases from /č/. An autonomous phonemic analysis of Barrow Inupiaq would immediately seize upon the fact that the two segments are in complementary distribution to posit s as an allophone of č. To recapitulate the distribution: only č and not s may be long, s occurs before vowels (which includes word-initial position), and č occurs before (stop) consonants and word finally. Thus, if only č is considered underlying, all occurrences of s can be derived from it by Rule 9, Assibilation. For reasons described in Section 3.24, we see no particular advantage and several inconveniences in considering č and s as derived from a single segment.

This approach would encounter difficulty in Kobuk of course where short č may occur between vowels, usually morpheme-internally, as the palatalized variant of /k/. Attributing s and č to a single underlying segment would necessitate deriving what actually appears on the surface as intervocalic č from /k/, even in instances where there is no alternation, resulting in the following derivations: /VčV/ ⟶ [VsV], but /ikV/ ⟶ [ičV].

Although the virtues of subsuming s and č under the same phoneme do not justify the difficulties which would be created, the s/č alternation described in this section seems to indicate that s may in fact be the intervocalic allomorph of č, at least historically. Otherwise,

there is no a priori reason to expect the geminate alternate of s to be č: rather than s:. Just as the g/kk alternation can be accounted for through an intermediate single k, so might the s/č: alternation be derived from single č, although not synchronically.

The case of y is not so easily handled since the long alternant of y, conditioned by what we have loosely called gemination, may be either [č:] or [y:]. A given morpheme may exhibit only one alternant if it contains y. Yet, clearly y alternates with č in a situation other than the one under consideration here. As presented in Chapter II, the assimilation process yields y from č preceding a voiced fricative, e.g. iñuiyguuq 'the people, it is said...' from iñuich 'people' + -gguuq rep. While the y/č alternation is regular when it results from the assimilation rule, it is not so between vowels since some occurrences of single intervocalic č are manifested as s and others as y. Historically, there appear to be intervocalic s/č and y/č alternations although it is anything but obvious how these can be predicted from an underlying /č/ or, in the other direction, how to recognize y which alternates with č against that which does not.

In terms of a synchronic solution, the y which alternates with č can best be marked specially to indicate this fact, while other y's alternate in a regular manner with [y:] as predicted by the gemination process. The

entire problem, and especially the doublet nusaq/nuyaq 'hair', does nonetheless suggest a phonological relation between s and y, although the precise nature of this relation is not clear.

5.25 Alternation involving t

Intervocalic alternants of /t/ are demonstrated by the following:

(103) t/ř:

imiq- 'drink'	+	-tuq 3s	⟶	imiqtuq 'drinks'
niġi- 'eat'	+	-tuq	⟶	niġiruq 'eats'
aŋuniaq- 'hunt'	+	-ti agent	⟶	aŋuniaqti 'hunter'
niġi- 'eat'	+	-ti	⟶	niġiri 'eater'
iga- 'cook'	+	-ti	⟶	igari 'a cook'

(See also 5.23 for further examples.)

(104) t/t:

aiviq 'walrus'	+	-tuq- 'eat'	+	-tuq 3s	⟶	aiviqtuqtuq 'eats walrus'
niqi 'meat'	+	-tuq-	+	-tuq	⟶	niqituqtuq 'eats meat'
iñuk 'person'	+	-tualuk 'only'			⟶	iñutualuk 'the only person'
B qimmiq 'dog'	+	-tualuk			⟶	qimmisualuk (with assibilation) 'the only dog'
niqi 'meat'	+	-tualuk			⟶	niqitualuk 'the only meat'

(105) t/l:

navik 'break'	+	-tiq- 'quickly'	+	-tuq 3s	⟶	naviktiqtuq 'breaks quickly'

iku- + -tiq- + -tuq ⟶ ikuliqtuq
'get in' 'gets in quickly'

Suffix-initial t's must therefore be marked specially if their intervocalic alternant is other than ř as predicted by the lenition rule.

As discussed for forms in Section 5.21 above, the lenition and gemination rules may be used to account for the alternations g/kk from /k/ and ġ/qq from /q/, although the synchronic viability of this process was said to be questionable. Further doubt is generated by the fact that while t and p have the lenited variants ř and v (niġi- 'eat' + -pa 3s inter ⟶ niġiva 'is he eating?'), these segments may not undergo gemination to yield their stop alternants. Corresponding to the alternation of voiced back fricatives with geminate stops, we thus expect to encounter the alternations ř/tt and v/pp which are non-occurring in Alaskan Inupiaq.[5] Geminate alternants of ř and v are always [+continuant], e.g. iri/irrak 'eye, sg. and dual' and avïk-/avvaq 'to halve'/'half', although such geminates are found only after the first vowel mora of the word which is precisely the position in which alternation is not expected. Elsewhere, ř and v resist gemination, e.g. K auraq/aurat 'summer, sg. and pl.', niġiraq/niġirat 'eaten thing, sg. and pl.', niġġivik/niġġiviik 'table, sg. and dual'. (In all these examples, gemination

5. West Greenlandic has the v/pp alternation in a limited number of endings, viz. niRivuq/niRipput 'he eats'/'they eat' and niRiva/niRippat 'is he eating?'/'are they eating?'.

is expected in non-singular forms.) In the case of niġiraq at least, ɣ̌ is the intervocalic alternant of t but fails to geminate and give the expected long stop [t:].

5.3 Alternation of continuants with zero

The continuants ɣ, ġ, and ɣ̌ are found to alternate with zero in two principal environments. Frequently, stem-internal geminate continuants alternate with zero; additionally, continuants beginning suffixes or otherwise located at morpheme boundaries may show this alternation. As Rischel points out (1974:250), these are "the same types of positions where the stop-continuant alternations are observed."

5.31 Stem-internal alternations

(106) Ø/gg:

puuq	'sack'
pugguk	dual
puggut	plural
tuuq	'ice chisel'
tugguk	dual
tuggut	plural
B ai-	'to go home'
B aggiiñ	'go home!' (int imp 2s)
pai-	'to stay behind'
paggiiñ	'stay behind!' (int imp 2s)
nai-	'to smell something'
naggiuŋ	'smell it!' (tr imp 2s-3s)
tai-	'to say the name of something'
taggiuŋ	'say its name!' (tr imp 2s-3s)
taggiñ	'a name of something, term'
B kii-	'to bite'
kiggiuŋ	'bite it!' (tr imp 2s-3s)
kiggiñ	'clothespin' (lit. 'instrument for biting')
kigun	'tooth'

	mau-	'to sink into something'
	magguvik	'place where one sinks in'
	sau-	'to bury'
	saġguuŋ	'bury it!' (tr imp 2s-3s)
	pui-	'to surface, of a sea mammal'
	puġġivik	'surfacing place'
	ŋau-	'to grow'
B	naġguksaun	'fertilizer'
	iñuu-	'to be alive'
B	iñuġgun	'life'

(107)	B	qai-	'to come'
Ø/ġġ:		qaġġiiñ	'come!' (int imp 2s)
		qaġġivik	'time of coming'
		qui-	'to urinate'
		quġġiiñ	'urinate!' (int imp 2s)

Showing the same alternation, although less well motivated synchronically, are the following:

umiaq		'skin boat'
umiġġiq-	[6]	'to provide with a skin boat and, by extension, with a whaling crew'
taaq-		'to be dark'
taġġaq		'shadow'
tuvaaq		'hunter'
tuviġġat		'hunters pl.; also, the name of a constellation'
unaaq		'sealing harpoon'
uniġġat		'sealing harpoons pl.'

(108)	asiaq	'berry'
Ø/řř:	asirrat	plural
	asirramik	mod sg
	quaq	'frozen meat or fish'
	qurrat	plural

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6. Inconsistent with other examples, the plural of umiaq is umiat and never *umiġġat.

unipkaaq	'legend'
unipkarriq-	'to provide with a legend'
paa	'door, opening'
parrat	plural
parramun	term sg
kuuk	'river'
kurrak	dual
kurgich	plural
auk	'blood'
arriq-	'to provide with blood, give a transfusion'
arriqi-	'to hemorrhage'
qia-	'to cry'
qirraiñ	'cry!' (int imp 2s)
qirran	'a dirge'

5.32 Discussion of the data

Alternation of the type found in [illegible] forms is well attested throughout Eastern Eskimo and [illegible] been discussed at length in the literature on Greenlandic,[7] although it appears that Alaskan Inupiaq maintains consonant alternation in some forms where it has become defunct in dialects to the east, for instance, kuuk 'river' shows no internal alternation in West Greenlandic.[8] Of forms containing a geminate consonant which alternates with zero, it is typically the zero alternant which is found in "basic" (uninflected) forms such as the absolutive case singular

7. Schultz-Lorentzen (1945), Ulving (1953), and Rischel (1974) among others.

8. The conservative allomorphs of kuuk found in Alaska indicate an underlying representation of /kurĭk/ with gemination and vowel alternation in the dual kurrak and syncope in the plural kurgich and kurga 3s poss. These forms are otherwise kuuk dual, kuugich plural, and kuuŋa 3s poss.

for nouns or the stem for verbs. Allomorphs containing a geminate often characterize a conservative style of speech, and these coexist freely with equivalent forms not manifesting stem-internal alternation. Alternative inflected forms, like asiat for the plural of asiaq 'berry' or quat for the plural of quaq 'frozen meat', show no consonant alternation and in most instances represent more current usage.

In order to account for the alternations found in the above forms, it is necessary to recognize that the fricatives which alternate with zero are always geminate and occur moreover under precisely the conditions where we expect the gemination rule to apply. Indeed, we have found that suffixes like the nominal plural -t, the dual -k, the instrumental nominalizer -n, noun case endings (-mik, etc.), and imperative verb inflections normally trigger gemination. It is only in the environment of such gemination-causing suffixes that the consonantal alternants of zero are found above.

The intervocalic consonants in question which appear only in geminate form represent, in historical terms, consonants which were originally part of the stem but underwent deletion under conditions discussed in subsequent sections of this chapter. Ideally, then, these stems of the form $C_oV(C)V\#$ reflect closely the shape of corresponding Proto Eskimo stems, where the parenthesized C is the one which has undergone deletion, yet may reappear

as a geminate. In fact, comparison with Central Yupik shows that some Inupiaq stems have been restructured and that while an intervocalic consonant certainly was present in Proto Eskimo cognate forms, these consonants are not always the ones which appear in Inupiaq. For example, AI pu(g)i- 'to surface' matches CY puge- allowing for a probable reconstruction of PE *pugə-. AI a(g)u- 'rot', however, is cognate with CY aRu- leaving the nature of the original intervocalic consonant in doubt. Similarly, the match between AI na(g)i- 'to smell' and CY naRe- is imperfect, but cf. AI naġiuq- 'to sniff'.

There appears to be a tendency to generalize (g) in Inupiaq, where Central Yupik and likely Proto Eskimo shows a uvular. Inupiaq keeps the uvular (ġ), however, in uvular-initial stems, such as qu(ġ)i- (CY quXe-) 'urinate' and qa(ġ)i- 'to come' (no CY cognate). Apparently, though, a stem-initial q in Inupiaq does not automatically cause a following (C) to be a uvular, cf. AI qa(g)u- 'to dawn' (i.e. qau-) and qagguvik 'time of dawning'.

Geminate uvulars which appear in the second group of forms of (107) do not fit our description of stems like qu(ġ)i- and qa(g)u- above. The verb stems discussed in the preceding paragraph exhibit productive C/Ø alternation in that gemination occurs in all cases where it is expected. In the case of umiaq, we expect gemination in the plural, but it is never found (see note 6). Also, the pair (107)

taaq- 'be dark' and taġġaq 'shadow' are not related in an obvious synchronic way.

Thus, in verb stems where geminates emerge as a result of productive morphology, e.g. qagguvik 'time of dawning' from qau- 'to dawn' + -vik 'time, place', g may be generalized as the intervocalic C, except where ġ is retained under the influence of a preceding uvular, e.g. qu(ġ)i- 'urinate'. Uvulars are also retained in a few surviving lexicalizations, e.g. umiġġig- 'provide with a boat'. While some restructuring has taken place, the intervocalic consonants treated are not on the whole predictable since they reflect, for the most part, archaic segments of the proto language.

The evidence presented here that many sequences of VV can be proven to be historically *VCV must eventually raise the question of whether Proto Eskimo actually had any long vowels or vowel sequences. To touch briefly on the question here based on our findings for Inupiaq, it is crucial to know whether there are any VV sequences where the appearance of an intervocalic C is impossible. Ukiuq 'winter' has the plural ukiut, apparently throughout Inupiaq. Yet CY uksuq 'winter' suggests that the Inupiaq word is originally *ukyuq and that the reason no geminate occurs is that the modern vowel cluster iu is derived from a sequence of glide plus vowel. The question for Proto Eskimo is an open-ended one and extends beyond the domain of the

present work. Yet, it is of interest that the Inupiaq evidence so far suggests no examples of VV sequences for Proto Eskimo.

5.33 Continuant deletion

The conditions for deletion of single fricatives must next be established; clearly there exist instances of single medial fricatives in the language not subject to deletion, e.g. iqa- 'to cook', niġi- 'to eat'. Since the productivity of stem-internal alternation is open to question, it is helpful at this time to refer to other continuant-zero alternations in the language, which occur at morpheme boundaries and which may help clarify the nature of all such alternations. First, we will treat alternations of velar and uvular fricatives with zero and later discuss ɣ̌/ʁ alternations. The labial continuant v is not subject to intervocalic deletion.

5.331 Velar deletion at morpheme boundaries [9]

There is a series of suffixes which appear in most cases to be vowel initial and yet sometimes occur with a velar continuant preceding the vowel:

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9. We use the term velar deletion to refer to the deletion of both velar and uvular continuants as described by Underhill (1970) and called velar dropping in the Yup'ik Eskimo Grammar.

(109) B -(g)u, K -(ŋ)u 'copular; have many NOUNS; there to be many NOUNS'

pana	'spear'
panauruq	'is a spear; has many spears; there are many spears'
ulu	'woman's semilunar knife'
uluuruq	'is a woman's knife, etc.'
inĭ	'place, room'
inauruq	'is a place, room'
amiq	'skin'
amiuruq	'is a skin'
tupĭq	B 'tent', K 'house'
tupquruq	'is a tent, house'
kamĭk	'boot'
kamŋuruq	'is a boot'
aġvĭq	'whale'
aġvĭġuruq	'is a whale'
puuq	'sack'
B puuguruq	'is a sack'
K puuŋuruq	'is a sack'
kuuk	'river'
B kuuguruq	'is a river'
K kuuŋuruq	'is a river'
kikiak	'nail'
B kikiaguruq	'is a nail'
K kikiaŋuruq	'is a nail'

(110) B -(g)iṭ-, K -(ŋ)iṭ- 'not to have; there to be no NOUNS'

panaitchuq	'has no spear; there are no spears'
uluitchuq	'has no woman's knife, etc.'
inaitchuq	'has no place'
amiitchuq	'has no skin'
saviitchuq	'has no knife'
tupqitchuq	'has no tent (B), house (K)'
kamŋitchuq	'has no boots'
aġvĭġitchuq	'has no whales'
B puugitchuq	'has no sack'
K puuŋitchuq	'has no sack'
B kuugitchuq	'has no river'
K kuuŋitchuq	'has no river'
B kikiagitchuq	'has no nails'
K kikiaŋitchuq	'has no nails'

(111) B -(g)iq-, K -(ŋ)iq- 'to be deprived of one's NOUN'

panaiqsuq	'is deprived of his spear'
uluiqsuq	'is deprived of her knife'
inaiqsuq	'is deprived of his place'
amiiqsuq	'is deprived of its skin'
saviiqsuq	'is deprived of his knife'
tupqiqsuq	'is deprived of his tent, house'
kamŋiqsuq	'is deprived of his boots'
aġvïġiqsuq	'is deprived of its whales'
B puuçiqsuq	'is deprived of his sack'
K puuŋiqsuq	'is deprived of his sack'
B kuugiqsuq	'is deprived of its river'
K kuuŋiqsuq	'is deprived of its river'
B kikiagiqsuq	'is deprived of its nails'
K kikiaŋiqsuq	'is deprived of its nails'

(112) -(ŋ)a- absolutive noun possessive 3s-3s

panaa	'his spear'
ulua	'her knife'
inaa	'his place'
amia	'its skin'
savia	'his knife'
tupqa	'his tent, house'
kamŋa	'his boot'
puuŋa	'his sack'
kuuŋa	'its river' (see note 8)
kikiaŋa	'its nail'

In the above cases, a vowel-initial suffix normally follows directly the last vowel of the stem, deletion of a stem-final consonant being triggered as a result of the suffixation process except as discussed below. In some cases a consonant is found preceding the suffixal vowel, as in B puuguruq/K puuŋuruq 'it is a sack'. The g or ŋ found in these forms is presumably associated with the copular suffix, since the stem-final C can only be a uvular; g or ŋ fails to undergo deletion as in other forms when the result would be a disallowed series of three vowels.

It is also possible to view the g/ŋ as an epenthetic consonant inserted to break up a three-vowel cluster.[10] The problems with the epenthesis solution for Alaskan Inupiaq are three: 1) In Barrow, the epenthetic C is g except in the 3s-3s absolutive possessive ending where it is ŋ; thus two rules of epenthesis are needed and morphological markings on the endings must select between them, so that the correct velar (g or ŋ) is epenthesized. This solution comes close to saying that the consonant in question is associated directly with the suffix itself. In the Kobuk dialect, however, only ŋ is found and a single epenthesis rule will then suffice. 2) It has been claimed that ï/a alternation is due to the underlying presence of a suffixal velar which is deleted in cases such as inï/inaa 'place'/'his place' from inï + ŋa. If ŋ were epenthesized only in cases where it appears on the surface, the putative conditioning for this vowel alternation would be removed. 3) The Barrow form iñuqqun 'life' suggests strongly that the copular has an initial g associated with it. The verb stem iñuu- 'to be alive' is probably derived from iñuk 'person' + +(g)u- 'copular'. Iñuqqun, the nominalized form of the verb stem, shows a geminate which we take to be the initial velar of the copular suffix, this velar being deleted when single in iñuu-. Of course, there is another

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10. For West Greenlandic, Rischel treats the analogous suffix-initial consonants as epenthetic glides.

velar in this position at some level of the derivation, this being the final C of iñuk, perhaps underlying /iñug/. Evidence from other forms of the language gives no reason to believe, however, that a deleted stem-final C may be recoverable by gemination. Based upon consonant alternations which are attested within Inupiaq, then, the only likely source for the geminate velar of iñuggun is a suffix g which is subject to deletion when single.

There exists yet a further reason to believe that at least one of the above listed suffixes has an initial velar. In the case of the 3s-3s possessive suffix, restructuring has occurred within the paradigm so that a velar nasal is present in all forms.

(113)

Stem	Possessed form	
	Conservative	Innovative
inī 'place,room'	inaa	iniŋa
ulu 'woman's knife'	ulua	uluŋa
amiq 'skin'	amia	amiŋa
savik 'knife'	savia	saviŋa
kamīk 'boot'	kamŋa	kamiŋa
tupīq B 'tent', K 'house'	tupqa	tupiŋa
puuq 'sack'	puuŋa	puuŋa

This possessive ending has been reanalyzed as a strictly deleting type with the shape -ŋa. Within innovative forms, the velar nasal must be analyzed as the initial segment of the ending and not as an epenthetic consonant.

As yet unexplained is the behavior of stems with penultimate ī since in conservative speech, this vowel is subject to syncope in the above cases causing retention of

the stem-final consonant. In tupqa 'his tent' we find no trace of the initial ŋ of the possessive inflection, and the presence of this ŋ underlyingly in /tupĪq + ŋa/ seems to create an environment not conducive to syncope of Ī. In apparent contradiction to the arguments given above, evidence from stems with no penultimate Ī suggests that suffix-initial velar continuants are generated by epenthesis in these cases. If the C in question is inserted following vowel sequences, the correct result will be obtained and the absence of suffixal ŋ or q will not have to be accounted for in cases such as tupqa and aġviġuruq 'is a whale'. Discussion of this problem is continued in the following section.

5.332 Velar deletion in plurals

In the data which have been discussed so far, velar continuants are deleted consistently when intervocalic except where their deletion would create a disallowed sequence of three vowels. For this reason we find savia 'his knife' and saviuruq 'is a knife', but puuŋa 'his sack' and B puuguruq, K puuŋuruq 'is a sack'.

There is another instance, however, in which single intervocalic velar and uvular continuants fail to undergo deletion, as exemplified by some plural nouns.[11]

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11. For a detailed analysis of the pluralization process in nouns, see Section 6.211.

(114)

	singular	plural	
B	iqaluk	iqaluich	'fish'
K	qaluk	qaluich	'fish'
	savik	saviich	'knife'
	mannik	manniich	'egg'
	ivĭk	ivgich	'grass'
	siksrĭk	siksrĭgich	'ground squirrel'
	avvaq	avvaich	'half'
	natchiq	natchiich	'seal'
	aivĭq	aivġich	'walrus'
	manĭq	manġich	'tussock'
B	punnĭq	punnĭġich	'loaf of bread'
	aġvĭq	aġvĭġich	'whale'

- The case of plurals is comparable to that of copulars like amiuruq 'is a skin' versus aġviġuruq 'is a whale', where the intervocalic uvular is retained in the second form but not the first. In these forms, a stem-final velar or uvular may be deleted except when the preceding vowel is ĭ. In this case ĭ may undergo syncope when the environment permits, i.e. a single C precedes (see 4.5) as in manġich 'tussocks'. Syncope may not apply when a consonant cluster precedes ĭ, and then single intervocalic fricatives remain undeleted as in siksrigich 'squirrels' and aġviġich 'whales'.

These plurals contrast with forms like inauruq 'is a place' /inĭ + (g)u + ruq/ and inaa 'his place' /inĭ + ŋa/ where velar continuants are deleted following underlying ĭ. It was proposed in Section 4.41 that the ĭ/a alternation found here is conditioned by a suffixal velar. Once vowel alternation has occurred, the velar is no longer preceded by ĭ, and velar deletion may apply. Vowel alternation accounts for the deletion of the velar in inauruq

as well as its retention in siksrigich.

An intervocalic velar then fails to delete in two environments: 1) when there is an adjacent long vowel or diphthong, 2) when ĭ precedes. In both cases failure of velar deletion may be seen as serving to preserve the canonical shape of morphemes in the language by avoiding the creation of unpermitted vowel sequences. Case 1 prevents the generation of clusters of three vowels. Case 2 avoids giving rise to vowel clusters containing ĭ, since ĭ may not normally cluster with another vowel. Whereas a suffixal velar will cause ĭ to alternate with a and thus prevent a disallowed ĭV cluster, as in inaa 'his place', a stem-final velar does not trigger alternation of a preceding ĭ and therefore must be retained to prevent the ĭV cluster, as in siksrigich 'squirrels'.

A rule of velar deletion may now be stated to account for these forms:

Rule 13 Velar Deletion

$$\begin{bmatrix} C \\ +\text{back} \\ +\text{continuant} \end{bmatrix} \rightarrow \emptyset / \left\{ \begin{matrix} \# \\ C \end{matrix} \right\} \begin{bmatrix} V \\ \langle -\text{high} \rangle \\ \langle +\text{back} \rangle \end{bmatrix} ____ V$$

Because long vowels and diphthongs are analyzed as vowel sequences, the existence of only one vowel before the consonant which is slated for deletion means that this vowel is short and not preceded by another vowel. In addition, this vowel may not be ĭ.

Returning now to the question of the apparently

velar-initial suffixes discussed in Section 5.331, e.g. -(ŋ)a 3s poss, Rule 13 will account for the loss of stem-final consonants except when preceded by Ī if suffixal ŋ is considered rather to be epenthetic when it appears, e.g. tupqa 'his tent' from /tupīq + a/. These suffixes should be considered non-truncating so that only appropriate stem consonants fail to delete, as that in aġviġuruq 'is a whale'. But this tactic predicts retention of the stem consonant in puuq, giving *puuġa rather than the correct puuŋa for 'his sack'. Thus, stems in VVC# require that the class of suffixes in question be regarded as truncating a stem-final C; stems in ĪC#, e.g. aġvīq 'whale', require that suffixes be non-truncating with final consonants deleted instead by Rule 13 and "suffixal" velars epenthetic rather than underlying; other stems permit either solution. In addition stems ending in Ī give a preference for underlying suffixal velars if we wish to continue to analyze them as conditioning alternation of Ī with a.

The situation is paradoxical and no one set of conditions accounts for all forms. Historically, these suffixes are probably non-truncating since loss of stem-final consonants may be accounted for in terms of velar deletion rather than truncation, cf. CY anyaa 'his boat' from /aŋyaq + a/ but CY kuiga 'his river' from /kuik + a/. Moreover, at least Central Yupik evidence shows suffix-initial velars to be present only after stems ending in

a vowel sequence, cf. CY uiŋa 'her husband' from /ui + (ŋ)a/. The difference between Alaskan Inupiaq and Central Yupik comes in stems ending in VVC#, since AI forms have a suffixal or epenthetic C, e.g. kuuŋa 'his river' from kuuk 'river', while CY forms maintain the stem-final C, as in kuiga 'his river'. This difference is the source of the Alaskan Inupiaq paradox described above which will have to be accounted for synchronically in terms of morphological markings on stem consonants.[12]

5.333 Stem-internal velar deletion

The above sections demonstrate velar deletion as it occurs at morpheme boundaries, applying to stem-final or suffix-initial consonants. This rule is fairly productive in the cases cited, governing the alternation of single velar continuants with zero.

Velar deletion may also be said to occur stem-internally when forms in Section 5.31 are considered, yet

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12. The discrepancy described here between Yupik and Inupiaq is probably the result of the advent of the Inupiaq lenition rule (see 5.23). The Yupik forms aRveqa 'my whale' and aRveRa 'his whale' give identical cognates in Inupiaq: aġviġa. WG iRniRa means both 'my son' and 'his son' (from WG iRniq 'son') and the same is true for a few very conservative Alaskan Inupiaq speakers who use iġñiġa (from AI iġñiq) similarly (cf. CY eRneqa 'my day' and eRneRa 'his day' from erneq 'day'). For most Alaskan Inupiaq speakers, however, 'his son' is iġñiŋa and 'his whale' aġviŋa. The conservative pattern predicts syncretism of 1s-3s and 3s-3s absolutive possessives in forms containing a penultimate ĭ (following a consonant cluster) or a long vowel. This may explain the break in the conservative pattern at this point, i.e. 3s-3s possessives use the full form of the suffix -ŋa precisely in those cases where syncretism is anticipated.

this deletion is far less productive and easily recoverable than that which is found at morpheme boundaries. Many instances of stem-internal velar deletion are recoverable only by cross-linguistic comparison, cf. AI paundaq and SLI pagunRaq 'blackberry', AI qauq and SLI qaguq 'forehead'. In other cases deleted velars have a geminate alternant, e.g. puuq/puggut 'sack, sg. and pl.' which attests that velar deletion has applied. A single velar is deleted and a geminate retained.

If underlying forms like /puguq/ are posited with a single intervocalic velar, then forms containing the geminate alternant, e.g. puggut, can be generated by the gemination rule; forms with the zero alternant of /g/ must be derived by means of a velar continuant deletion rule. Since the operation of such a rule has already been established at morpheme boundaries, it seems worthwhile to try to relate this velar deletion process to the stem-internal one.

The data presented in Section 5.31 illustrate alternation of velar and uvular continuants with zero; other relevant data to the problem would consist of instances of single stem-internal velar continuants which never undergo deletion, although they may engage in other alternations, such as gemination.

(115) g: iga- 'to cook'
igaruq '(someone) is cooking'
iggaiñ 'cook!'
iggavik 'kitchen' (lit. 'cooking place')

	nigaq	'a snare'
	niggat	plural
	niggamik	mod sg
	nigiq	'north wind'
	niguq-	'to quit one's work'
	tigu-	'to grab'
	tigguuŋ	'grab it!'
	agiaq	'a file; to file'
	ugiaq-	'to snarl, fight, of dogs'
	tuugaaq	'tusk; ivory'
	agik-	'to file, rub'
	magu-	'to howl, as of dogs'
B	yugit-	'to travel around'
(116) ġ:	iġisaq-	'to pluck a fowl'
	niġi-	'to eat'
	niġiruq	'is eating'
	niġġiiñ	'eat!'
	niġġivik	'table' (lit. 'eating place')
	niġutu-	'to be wide'
	piġit-	'to bend'
	naġiaq	'bait'
	naġiuq-	'to sniff'
	maġaala-	'to howl with pain'
B	tiġiaq	'weasel'
K	uġiaq-	'to expectorate'
	taġiuq	'sea; salt'
	aġayuk-	'to travel around'
	aġit-	'to become damp'

The above data exclude velar and uvular fricatives which are derived from stops, since an abstract solution to Inupiaq consonant alternation will posit underlying stops in these cases, excluding them as input to a rule deleting

velar fricatives. In other words, the back fricatives in putuguġ 'big toe' and amaġuq 'wolf' are known to be derived from stops, see Section 5.22, and are thus not considered exceptional to velar deletion.[13]

In the forms given above, a pattern may be discovered which includes all but five stems. Instances of q and ġ which fail to delete when single are either flanked by a long vowel, vowel cluster, or diphthong, or else preceded by [i]. In the latter cases the repeated presence of [i] before q or ġ suggests strongly that the vowel is /Ī/, which has been found to block velar deletion at morpheme boundaries. While it is normally difficult to discover the underlying identity of stem-internal i, information from within Inupiaq, as well as comparison with Yupik, suggests

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13. Similarly, we do not expect the initial q of the transitive verbal inflections to delete, as in iqaqiñ 'you are cooking it' from iqa- 'cook' + -qiñ 2s-3s transitive, since this q alternates with k, as in tautukkiñ 'you see it' from tautuk- 'see' + -kiñ 2s-3s. Difficulties arise with the 1s-3s possessive suffix:

uluga	'my woman's knife' (ulu)
nunaga	'my land' (nuna)
saviga	'my knife' (savik)
qayaġa	'my kayak' (qayaq)

Historically, we understand these back fricatives to be derived from stops, cf. CY nunaka 'my land', and for this reason they do not delete, although the stops are never recoverable in Inupiaq 1s-3s poss forms. However, 1s-3d forms, e.g. nunakka 'my two lands' and 1s-3p forms, e.g. nunatka 'my lands' show the 1s poss morpheme to be -ka as in Yupik.

that we are indeed dealing with /ĭ/. [14] We have established that initial alveolars are never followed by /i/. which suggests that niġi-, nigaq, tigu-, etc. contain initial Cĭ sequences (see 3.32).

In any case the Central Yupik cognates of these forms are enlightening:

(117)

Central Yupik	Inupiaq	
ega-	iga-	'to cook'
negaq	nigaq	'a snare'
negeq	nigiq	'north wind'
tegu-	tigu-	'to grab'
eRitaR-	iġisaq-	'to pluck a fowl'
neRe-	niġi-	'to eat'
peRe-	piġit-	'to bend'

In the case of velars and uvulars which apparently fail to delete adjacent to a non-short vowel, this claim must be examined in light of our hypothesis that historically, at least, there are no VV sequences (see 5.32). In the case of naġiaq 'bait', it is meaningless to claim that ġ fails to undergo deletion because of an adjacent vowel cluster, when this cluster is verifiably a sequence of VCV, cf. naġirrat pl. In fact, it seems that the deletion rule applies from right to left; beginning with /naġiɬaq/, deletion of the rightmost deletable segment ɣ gives rise to

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14. Of the stems cited in Section 3.1 to illustrate g/Ø alternation, there is one which is notably aberrant: 'to bite' is kii- in Barrow and kigi- in Kobuk, casting doubt on a reconstruction of the historical underlying form. CY kexe- indicates that both i's were originally ĭ in Inupiaq, although for velar deletion to take place in the Barrow form, we expect the first i to be /i/ and not /ĭ/. This case represents the only discrepancy of this sort between the two dialects that we know of.

a vowel cluster which blocks deletion of ġ (see 5.342 for a discussion of ř-deletion).

Of the forms cited to illustrate single back fricatives not subject to deletion, there are several which are exceptional to the velar deletion rule even with the conditions which have been placed on the vocalic environment of consonants which may undergo the rule. Stems like aqik- 'to rub' or magu- 'to howl' contain q in environments where velars are normally subject to deletion. If a synchronic rule of velar deletion is allowed to apply stem-internally, then certain forms will have to be marked as not undergoing the rule. For example, two underlying representations of the form /magu-/ will be posited. The one meaning 'to howl' will be excepted from velar deletion giving magu- while the stem meaning 'to sink into something' will undergo velar deletion, giving mau- which has the allomorph maggu- when subjected to gemination.

magu (-VD) + ruq	magu + ruq	magu + vik (+Gem.)
_____	_____	magguvik Gemination
_____	mauruq	_____ Velar del.
maguruq 'howls'	mauruq 'sinks into something'	magguvik 'sinking place'

5.334 A solution to velar deletion

To recapitulate the total picture of velar deletion, the process is fairly well attested at morpheme boundaries with stem-final q and ġ failing to delete following I or

when adjacent to a (surface) long vowel or diphthong. A similar process functions stem-internally and appears to account for the deletion of g in puuq versus puggut 'sack, sg. and pl.' as well as the retention of g in forms like iga- 'to cook' and agiaq 'file'.

Whereas velar deletion functions more or less regularly at morpheme boundaries, its application is far more restricted within stems and perhaps less well motivated in terms of synchronic analysis. We believe that velar deletion offers a solution to the phenomena presented above at some level. Several arguments may be proposed, nonetheless, against the acceptance of a synchronic rule of velar deletion which would operate stem-internally. Those arguments are summarized in the following paragraphs.

First, positing B -gu- (K -ŋu-) as the underlying form of the copular seems reasonable since this morpheme may appear in this form on the surface or else simply as -u-, the g (or ŋ) having been dropped by velar deletion. Stem-internal use of the velar deletion rule, however, requires abstract underlying representations such as /puguq/ 'sack' where g is either absent or geminate in related forms, but never single as in the underlying form. Single g shows up when velar deletion is blocked -- in iga- 'to cook' or agiaq 'file' -- but this fact can hardly be said to justify a single g in /puguq/.

Second, stem-internal velar deletion must be blocked

by ï in order to generate correctly forms like iga- 'cook' and piġit- 'bend' where g or ġ is present. In these forms, however, /ï/ is posited strictly to block velar deletion and because of its position participates in no other phonological processes, i.e. syncope, failure to trigger palatalization, vowel alternation.

Third, for those stems which exhibit geminate velars and uvulars in alternation with zero, the allomorphs containing geminates are commonly suppressed, leaving no evidence for velar deletion. This is to reiterate what was pointed out in Section 3.2, that the plural puut is more often used than puggut, the latter type of plural being practically unknown to some speakers. Underlying forms such as /puguq/ are being restructured to /puuq/ so that velar deletion is no longer a problem stem-internally for most innovative speakers, who, however, maintain the process at morpheme boundaries so that the copular still exhibits the allomorphs -gu- or -ŋu- and -u-.

Last, exceptional stems like aġit- 'to become damp' and agik- 'to rub' suggest that velar deletion is not functioning as a synchronic phonological rule within stems, since there are no phonological grounds on which to except these stems from the rule.[15] Given the evidence, it

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15. Many of the exceptions to velar deletion which are found in West Greenlandic have Alaskan cognates which are not exceptional: WG naRasiq = AI naaġaayiq 'frog', WG naRajaq = AI naġiaq 'bait', WG taRajuq = AI taġiuq 'salt'. In 'frog' the Alaskan long vowels block velar deletion.

seems preferable to divide what is historically a unified process of velar deletion into a productive rule applying at morpheme boundaries and a non-productive process, the remains of which is found within stems.

5.34 Alternations of ɣ̌ with zero

Whereas the geminate ɣ̌ɣ̌ is found to alternate frequently with zero within stems, as illustrated by the examples in Section 5.31, very little if any productive ɣ̌/Ø alternation is found at morpheme boundaries. For this reason we have presented first the better defined and more widespread process of velar deletion, preferring to treat ɣ̌ with reference to what has been discussed for the back fricatives.

5.341 Alternations at morpheme boundaries

There is no case of ɣ̌ alternating with zero at morpheme boundaries which is as clear as what was demonstrated for ġ and q̇. One example, however, is provided by the 2s-3s transitive imperative verbal inflection:

(15, continued)

Assuming these vowels were somehow shortened in West Greenlandic, this process occurred when velar deletion was no longer productive in stems. In 'bait' and 'salt', WG inserted a glide in what was probably a vowel cluster, creating an exception to velar deletion from a form where this deletion is regularly blocked. CY taRyuq 'salt', however, suggests that the AI vowel cluster iu is derived from a sequence of glide plus vowel (see 5.32).

(118)

Stem	Imperative	
niġi-	niġġiuŋ	'eat it!'
iga-	iggauŋ	'cook it!'
supĭ-	suppuuŋ	'blow it out!'
qaiṭ-	qairruŋ	'give it!'
tuqut-	tuqurruŋ	'kill it!'
imiq-	imiġuŋ	'drink it!'
tautuk-	tautuguŋ	'look at it!'

When stems ending in a vowel are compared to those ending in t, the underlying form of the suffixal morpheme appears evident: -ruŋ. Assimilation of a stem-final t occurs as expected, giving tuqurruŋ 'kill it!' from tuqut- + -ruŋ. When -ruŋ is added to vowel-final stems gemination of a medial stem consonant is triggered and intervocalic ř is subject to deletion, giving niġġiuŋ 'eat it!' from niġi- + -ruŋ. In stems with a final ĭ, vowel alternation changes ĭ to u following gemination, e.g. suppuuŋ from supĭ- + -uŋ.

Stems with a final velar or uvular, however, cloud the picture, since although ř does not appear in imiġuŋ 'drink it!', tautuguŋ 'look at it!', the means by which ř is lost is not evident, and the inflection appears to be non-truncating -uŋ. The weakening of stem-final stops to fricatives (q ⟶ ġ, k ⟶ g) in the above forms is predictable in terms of the stop-continuant alternations discussed above (see 5.2). The loss of ř following k or q is not, however, attested as a productive phonological process of Inupiaq which casts doubt on the value of -ruŋ- to demonstrate synchronic alternations of ř.

Another case where single ɣ appears to alternate with zero is found following a restricted class of verbal suffixes, one of which is B -mmi-, K -pmi- meaning 'do also':

(119)

niġi-	+	K -pmi- B -mmi-	+	-ruq	→	K niġipmiuq B niġimmiuq
'eat'		'also'		3s int		'he eats also'
imiq-	+	-pmi- -mmi-	+	-ruq	→	K imiqmiuq B imiġmiuq
'drink'						'he drinks also'
tautuk-	+	-pmi- -mmi-	+	-ruq	→	K tautukmiuq B tautugmiuq
'see'						'he sees also'
makit-	+	-pmi- -mmi-	+	-ruq	→	K makitmiuq B makinmiuq
'stand'						'he stands also'

The ɣ of the 3s intransitive ending -ruq is deleted when it is between single vowels but not when preceding a vowel cluster, as is the case with velar deletion:

(120)

niġi-	+	-pmi- -mmi-	+	-ruaq	→	K niġipmiruaq B niġimmiruaq
				3s int past		'he ate also'

The only continuant deletable in these cases is ɣ, so that the initial g of the transitive suffix remains:

(121)

niġi-	+	-pmi- -mmi-	+	-giga	→	K niġipmigiga B niġimmigiga
						'I eat it too'

Similar alternation of ɣ is found following the suffix -yuma- 'should do; be willing or expect to do':

(122)

niġi-	+	-yuma-	+	-ruq	→	niġiyumauq
eat		should		3s int		'he should eat'

but,

niġi-	+	-yuma-	+	-giga	→	niġiyumagiga
				1s-3s tr		'I should eat it'

The initial ɣ of the intransitive verb endings is

not normally subject to deletion since it is the intervocalic alternant of the stop t; otherwise, we would expect *niġiuq 'he eats' instead of niġiruq. After suffixes, this ř does not usually delete as in tautuksimaruq 'he saw' (not *tautuksimauq), except if the suffix is one of the few which apparently condition deletion of a following ř. Because of its restricted nature, this process may not be considered phonological and will be triggered only by specially marked morphemes. At morpheme boundaries no truly productive alternations of ř with zero are found.

5.342 Stem-internal alternations of ř with zero

Within stems, the appearance of řř in alternation with zero under conditions where the gemination rule is normally expected to apply functions much the same as with velars and uvulars. Cases such as qirran 'dirge' from qia- 'cry' + -utï inst and asirrat 'berries' from asiaq 'berry' + -t pl are reminiscent of the stem-internal alternation of geminate back fricatives with zero which was discussed in preceding sections.

Positing a single intervocalic ř in underlying forms like /qiřa-/ 'cry' or /asiřaq/ 'berry' represents an analysis which is valid at least in historical terms. The gemination rule may apply to yield řř and a rule similar to velar deletion may account for the zero alternant of ř. The rule of ř-deletion could, in fact, be identical to that of velar deletion, since single intervocalic ř seems to remain following ï:

(123) tira- 'to let blood; to split into strips'
iri 'eye'
iriq- 'to hide'
tiriq- 'to make a rubbing sound'

A limited number of exceptions also occur where ř is found between single vowels and is not preceded by I:

(124) B arak- 'to exhort'
K tara 'then; that's all'

English borrowings:

(125) para 'butter'
B marasiq 'medicine'

Examples of this nature which violate the rule of ř-deletion and are not borrowings from English are extremely rare. In the case of tara, this Kobuk form is related to Barrow tavra, and the original consonant cluster is doubtless responsible for the retention of the single ř in tara. We have no explanation, however, for the exceptional form arak-.

The case for treating the ř/Ø alternation as a contemporary phonological process is weaker than that for the ġ/Ø and ġ̇/Ø alternations. In the latter cases, the alternations still function productively at morpheme boundaries, even though the instances of stem-internal alternation may be viewed as residue of an historical phonological process which is no longer productive. Only weak evidence is present for any sort of productive alternation of ř with zero within the word, and within stems it is unlikely that this process still operates as a phonological rule. No new cases of alternation are being formed; in fact loan

words freely violate the environment for ř-deletion as shown by 'butter' and 'medicine' above.

5.343 Gemination of ř

An apparent inconsistency with relation to other continuants is present in that not all occurrences of ř are subject to gemination. Underhill (1971:301) points out that Greenlandic aušaq 'summer' has the plural aušat without gemination, (Kobuk auraq and aurat), and later notes that "intervocalic š is normally deleted, so the base of ayuaq 'boil' can be /ayušaq/" to account for the plural ayuššat (p. 303). Rischel (1974:259) takes Underhill to task for failing to notice that š which fails to geminate also fails to delete at least in the case of aušaq, and that some relationship may be drawn between the two categories.

The Alaskan case is similar, although the data allow further conclusions to be drawn concerning deletion and gemination of ř. As pointed out in the preceding section, intervocalic ř is normally subject to deletion except when the preceding vowel is ĭ. In many cases where ř fails to delete, e.g. iri 'eye' and tira- 'let blood', it still exhibits a geminate alternant, i.e. irrak 'eyes, dual' and tirran 'knife used for blood-letting' (inst).

As in Greenlandic, there are instances of ř which fail to geminate, although these are not in all cases the same ř's which fail to delete:

(126) X auraq 'summer'
auram relative case
aurat plural

niġi- 'to eat'
niġiraq 'something eaten'
niġirat plural
niġiri 'eater'
niġirit plural

iga- 'to cook'
igaraq 'something cooked'
igarat plural
igari 'a cook'
igarit plural

Except for auraq which consists of a single morpheme at least synchronically (see below), the above forms can be divided into stem plus suffix. Trying the suffixes on consonant-final stems reveals alternation of the suffix-initial ř with t:

(127) aŋuniaq- 'to hunt'
aŋuniaqtaq 'something hunted'
aŋuniaqti 'hunter'

The intervocalic ř alternant of the t of -taq and -ti is precisely the ř which does not undergo gemination. Comparison of this situation with other cases of consonant alternation under gemination suggests that were the ř of niġiraq geminated in the plural, a geminate stop would be found, reflecting the underlying value of the ř. Just as the underlying velar obstruent is recovered under gemination in putuguq/putukkuk 'big toe, sg and dual', we might expect igaraq to have the plural *igattat.

The ř/tt alternation is, however, absent from the language. A tangible gap is present, inasmuch as ř fails

to geminate to ǰǰ in exactly the situation we expect alternation with tt. [16]

A case of ǰ whose failure to geminate remains unexplained thus far is found in K auraq 'summer'. In addition, the failure of ǰ to delete here bears explaining if we wish to accept the hypothesis of right-to-left fricative deletion. Both phenomena would be accounted for if this ǰ were derived from t, which is indeed a possibility if au- is taken to be the stem meaning 'rot, of food, ice, etc.'. The addition of the passive nominalizing morpheme -taq with subsequent lenition of t to ǰ gives auraq meaning literally 'something which has rotted' (cf. igaraq 'something cooked'). As demonstrated earlier, ǰ derived from t is subject neither to deletion nor to gemination.

5.4 Consonant gradation

A recapitulation in general terms of the types of consonant alternation covered in this chapter will help in probing the possibility that an overall system of consonant gradation functions within Inupiaq. Such a hypothesis would encompass stop-continuant and continuant-zero alternations as related processes which function within a unified system,

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16. The analysis which relates non-gemination of ǰ to its derivation from /t/ might shed light on the cause of an apparent inconsistency in West Greenlandic: gemination is found in the intransitive indicative paradigm, niRivuq 'he eats' vs. niRipput 'they eat', but not in the intransitive participial, niRišuq 'one who eats' vs. niRišut 'ones who eat'. The š here is derived from t and thus may not geminate.

although we might not wish to characterize this system as entirely synchronically viable.

In Section 2 it was shown that single obstruents regularly become voiced continuants except following the first vowel mora of the word, allowing for forms like siku 'ice' and niqi 'meat', in addition to putuguq 'big toe' whose velar continuant reflects a "weakened" velar stop as demonstrated by the dual putukkuk. Rischel too has observed that a "strong position" follows the first vowel mora (1974:245-247). Mora must be specified, for if the first vowel of a word is long, a diphthong, or a vowel cluster, lenition may follow, as in B qaugak/qaukkak 'duck, sg and dual'.

An underlying intervocalic continuant -- g, ġ, or ř -- is generally lost at any point within the word, except when geminate, giving continuant-zero alternations such as puuq/puggut 'sack, sg and pl'. The vocalic environment of the continuant may block deletion as discussed above, allowing for the retention of single underlying continuants as in iqa- 'to cook' or aqiaq 'file'.

Whereas most apparent exceptions to the continuant deletion process can be accounted for by restricting the vocalic configuration which triggers this deletion, exceptions to the stop lenition process are not easily accounted for synchronically. Numerous suffixes with an initial stop retain that stop intervocalically while in others, the stop lenites.

(128)

iri +	-kit- +	-tuq	⟶	irikitchuq
'eye'	'have a small NOUN'	3s int		'he has small eyes'
amiq +	-kit- +	-tuq	⟶	amikitchuq
'skin'				'has little skin covering (of a boat)'
isigak +	-kit- +	-tuq	⟶	isigakitchuq
'foot'				'has small feet'
ulu +	-ku		⟶	uluku
'woman's knife'	'left over'			'a left over knife'
amiq +	-ku		⟶	amiku
'skin'				'left over skin'
but, niġi- +	-kaa		⟶	niġigaa
'eat'	3s-3s tr			'he eats it'
tautuk- +	-kaa		⟶	tautukkaa
'see'				'he sees it'
imiq- +	-kaa		⟶	imiġaa
'drink'				'he drinks it'

The synchronic solution to this problem must involve marking suffix-initial stops as to their morphophonemic behavior. If lenition of stops is handled by phonological rule, then stops which do not lenite can be marked to except them from this process. A truly phonological solution to the question of how these two types of stops arose would be historical in nature with almost nothing to motivate it synchronically. We will propose such a solution nonetheless, since it serves our intention of describing a general system of consonant gradation for Inupiaq.

In general, suffixes may be considered truncating or non-truncating according to whether they delete or keep a preceding consonant upon affixation. A correlation may be

noted between the initial consonants of truncating suffixes and those consonants which fail to lenite when intervocalic.[17] Conversely, suffix-initial consonants of the non-truncating type are subject to lenition.

The above examples of (128) containing k-initial suffixes illustrate this correspondence as do the following:

(129)

	niġi- 'eat'	+	-piaq- 'really'	+	-tuq 3s int	→ niġipiaqtuq 'he really eats'
	imiq- 'drink'	+	-piaq-	+	-tuq	→ imipiaqtuq 'he really drinks'
	katak- 'fall'	+	-piaq-	+	-tuq	→ katapiaqtuq 'he really fell'
	aqpat- 'run'	+	-piaq-	+	-tuq	→ aqpapiaqtuq 'he really runs'
but,	niġi- 'eat'	+	-piaq- 'be liable to'	+	-tuq 3s int	→ niġiviaqtuq 'he is liable to eat'
	imiq- 'drink'	+	-piaq-	+	-tuq	→ imiqpiaqtuq 'he is liable to drink'
	katak- 'fall'	+	-piaq-	+	-tuq	→ katakpiaqtuq 'he is liable to fall'
	aqpat- 'run'	+	-piaq-	+	-tuq	→ aqpatpiaqtuq 'he is liable to run'

The truncating suffix -piaq- 'really do' shows no alternation, while the non-truncating suffix -piaq- 'be liable to' alternates with -viaq- when a vowel precedes.

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17. Some t-initial suffixes are exceptions to this generality, e.g. -tuq- 'eat, use' whose initial consonant does not lenite when intervocalic, although the suffix itself is non-truncating, cf. aġvictuq- 'eat whale' and niġituq- 'eat meat' (see also 5.25).

The fact that a stop like p (or k) behaves morphophonemically according to two separate patterns suggests that historically there existed distinct phonological entities which have merged to give modern p. The most likely possibility for an archaic distinction between these two types of p is that the truncating type was originally geminate.[18] Under this circumstance, the deletion of stem-final consonants would be conceivable as a phonological process; addition of a geminate to a consonant-final stem would give a prohibited cluster of three consonants.

The hypothetical historical geminate, moreover, fits within our evolving picture of a consonant gradation system. If the absence of an intervocalic consonant can result from a deleted continuant, and an intervocalic continuant can be derived from a stop, then it seems possible for a single stop to reflect an underlying geminate.

Finding evidence to substantiate the claim that at least some obstruents in Inupiaq result from simplified geminates poses a difficulty beyond that encountered for other consonant alternations, since this one will be the most abstract of all. Nevertheless, there is reason to believe the existence of a degemination process at some level, even synchronically. Degemination, if it exists, does not apply to the output of the gemination rule, but to geminates derived through affixation and underlying geminates.

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18. Suggested by Michael Krauss, personal communication.

For example, gemination gives the dual form irrak of iri 'eye'. Adding the first person possessive suffix -ka gives either irrakka or irraka 'my eyes' (irikka and irika are also possible). In the transitive indicative paradigm, 'he sees it' is most often tautukkaa, from tautuk- 'see' + -kaa 3s-3s transitive, although tautukaa is the form normally found in the upper Kobuk dialect. Other transitive forms containing kk may also be rendered with a single k.

In many instances where we expect tt, we find t instead:

(130)

aqpat-	+	-ti	⟶	aqpati		
'run'		agentive		'runner'		
aqpat-	+	-tit-	+	-kaa	⟶	aqpatitkaa
'run'		causative		3s-3s tr		'he makes him run'
tuqut-	+	-taq	⟶	tuqutaq		
'kill'		passive nom		'something killed'		

There are however exceptions to degemination where a long consonant derived by affixation -- aqpattuq (not *aqpatuq) 'he runs' -- or present underlyingly -- -qqaaq- 'to do first' -- remains long.

Evidence has yet to be adduced that the deleting suffixes presented above bear initial geminates underlyingly. Such a claim appears pointless if these geminates are habitually manifested as single stops on the surface. If we refer back to the case of the underlying single stops, we find that they lenite except following the first vowel mora of the word. In this position, then, there is some

chance that our hypothetical underlying geminates also occur in full form.

Stems containing a single short vowel, which would allow the suffixes in question to appear after the first vowel mora of the word, are rare. In fact, only one noun stem of this form seems to exist, this being quq 'urine'. The following examples contain stems of a single vowel followed by the suffix -piaq- 'really do' (verbal) or 'real' (nominal).

(131)

it-	+	-piaq-	+	-tuq	⟶	ipiaqtuq
'be'		'really'		3s int		'really is, exists'
put-	+	-piaq-	+	-tuq	⟶	pupiaqtuq
'bend over'						'really bends over'
quq	+	-piaq			⟶	qupiaq
'urine'		'real'				'real urine'

In these productive, synchronically segmentable forms, the initial consonant of -piaq- shows no sign of alternating with a geminate.

The suffix -kit- 'to have a small NOUN' has an interesting allomorph, however, in the form pukkitchuq 'is low'. The postbase is attached to an archaic stem *pu-,[19] which here appears to mean 'height' and is doubtless related to the initial pu- of other words pertaining to swelling and rising[20]: pupik 'pimple', pui- 'to surface',

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19. There are several examples of archaic stems which occur only in frozen forms containing analyzable suffixes: B quviasuk- 'be happy', B quviatchak- 'become happy', B quviasaaq- 'comfort, make happy', but not *quvia-.

20. Suggested by Jørgen Rischel, personal communication.

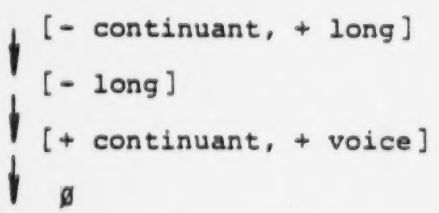
puvlaq- 'to rise, of dough', puvak 'lung'. In pukkitchuq the suffix which is normally -kiṭ-, cf. irikitchuq 'has small eyes', appears with an initial geminate as -kkiṭ-, which we hypothesize to be aṇ archaic form of this morpheme. In fact, the antonym of pukkitchuq is puqturuq 'is high' which also appears to contain an archaic form of the suffix which is normally -tu- 'have a big NOUN', cf. irituruq 'has big eyes'. The form -qtu- is used otherwise only with verb stems, cf. siññaqturuq 'sleeps too much' from siñik- 'sleep' + -qtu- 'overdo' + -tuq 3s int (see also 6.5). Precisely because pukkitchuq and puqturuq are not synchronically analyzable, we believe the forms of the post-bases they contain may be archaic. The allomorph -kkiṭ- may reflect an historical alternation between single and geminate consonants, the latter being preserved here immediately following the first vowel mora of the word in a lexicalized form.

If Inupiaq can be said to have underlying long consonants which are shortened except after the first vowel mora, the claim is strictly historical in nature since only traces of such a process exist synchronically and exceptions, i.e. long consonants following other than the first vowel mora, are present.

In historical terms, an alternation between single and geminate consonants where the latter are basic, i.e. not resulting from the gemination rule, is certainly very

old, dating back probably to Proto Eskimo. The point of this discussion is not to reconstruct Proto Eskimo consonant alternations, but to point out a possible reason for exceptions to the consonant alternations we have emphasized here. If an intervocalic stop fails to lenite, as k in -kit- 'have a small NOUN', this can be signaled by means of a special marking on the consonant. In search of the original phonological source for the two types of stop, we suggest the existence of historical geminates as a possible explanation rather than a conclusive analysis, since the full range of Inupiaq and other Eskimo data has not been explored.

Overall, the hypothesis of underlying geminates fits very well with the system of consonant gradation which has taken form over the course of this chapter. Assuming underlying geminate stops which tend to become single, we have shown that single stops lenite intervocalically to voiced continuants, and voiced continuants may be deleted, as depicted by the following schema:



Geminates may then be reintroduced into the system by means of the gemination rule which is presented in the following chapter. This schema applies only to (historical) underlying consonants, so that a consonant derived by this process may not serve as input to it.

CHAPTER VI: Consonant Gemination

6.1 Introduction

There are several possible sources for what appear on the surface as long or geminate consonants in Inupiaq. 1) These consonants may be underlying as in mannik 'egg', where there is no Inupiaq evidence to suggest any other source for nn. Also considered to be underlying would be a long consonant which exhibits no alternation within a single dialect, although cross-dialectal comparison may reveal that it has a cluster as its historical source. For example, B qimmiq 'dog' and anniq- 'to hurt' contain long consonants which do not alternate, although their Kobuk cognates, qipmiq and atniq- respectively, indicate that the Barrow geminates result from historical clusters. 2) Long consonants may result from affixation when a stem-final and suffix-initial consonant are brought together: tautuk- + -kiga ⟶ tautukkiga 'I see it', aqpat- + -niaq ⟶ aqpanniaq- 'run, fut'. 3) A process of consonant gemination lengthens a single medial consonant in the environment of certain suffixal morphemes, e.g. amiq 'skin', ammik dual, ammich plural, or niġi- 'to eat', niġġiiñ 'eat!', niġġivik 'table' (lit., 'eating place').

We consider the alternation of long and short

consonants in the third group of forms above[1] to be due to true gemination and not to any sort of process whereby two distinct segments are juxtaposed and completely assimilated to yield a surface geminate. An analysis based upon assimilation is in fact proposed several times in the literature for forms of the third type -- by Swadesh (1946), and later by Pyle (1970) and Sadock (1972) -- accounting for the geminate in WG ammit 'skins' by final vowel-consonant metathesis in the singular amiq, giving /amqi + t/ upon pluralization, and then complete progressive assimilation of the mq cluster to derive the geminate mm. An obvious problem to this solution is suggested by vowel-final stems, which have no final consonant to metathesize and which may show gemination nonetheless (see 6.2). In addition, although progressive assimilation exists in Alaskan forms like imġich 'waters' from /imĭq + (i)t/, the assimilation is not "complete". Such an analysis is ably argued against by Underhill (1971) and Rischel (1974) whose conclusions we support, both for Greenlandic and for the Alaskan data which are comparable. We will not then discuss a metathesis-assimilation type of analysis any further.

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1. Besides straightforward instances of gemination where a short consonant is found in alternation with a long consonant whose quality is otherwise identical -- m/mm, etc. -- there are consonant alternations which are certainly due to gemination historically, although such an analysis may not be justified synchronically. We refer to the stop-continuant and continuant-zero alternations discussed in the preceding chapter, as in putuguq/putukkuk 'big toe, sg and dual' or puuq/puggut 'sack, sg and pl'.

Gemination phenomena found in Alaskan Inupiaq are in many ways similar to those found in West Greenlandic, and for this reason we will refer to and rely on analyses proposed for that dialect. Generally, gemination occurs in the same sorts of environments in both dialects, although morphological differences account for the absence in one dialect of suffixes which trigger gemination in the other. For example, the dual noun inflection which governs gemination in Alaskan Inupiaq is no longer present in modern West Greenlandic, although old sources indicate that the archaic dual morpheme behaved similarly in that dialect.[2] The phonetic quality of geminates in West Greenlandic is often different from what is found in Alaskan Inupiaq, since geminate continuants, except nasals, are always voiceless in WG, cf. AI puggut, WG puxxut 'sacks'. (Nasals are considered continuants for West Greenlandic by Underhill (1971) but not by Rischel (1974).)

The most thorough and comprehensive account of gemination phenomena in Eastern Eskimo to date is offered by Rischel. Others -- Sadock (1972), Pyle (1970) -- who concentrate on the gemination found in inflected nouns are less able to investigate the subject thoroughly, since they do not treat the full range of data. While we agree essentially with Rischel's treatment of gemination, we intend here to

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2. Rischel cites Egede's grammar (1760): "Sabbik" 'knife, dual' equivalent to modern Alaskan savvik (1974:285, fn.7).

present and discuss the Alaskan situation in hopes that it may prove enlightening beyond a mere reiteration of those phenomena which it has in common with West Greenlandic.

Rischel defines three major categories of gemination in terms of the morphological types which appear to govern the gemination process. This system of classification is also applicable to Alaskan Inupiaq, and we adopt it for our discussion of gemination along with the accompanying terminology.[3]

Additive suffixation as defined by Rischel (1974: 192) is present when "the formative in question is attached at the end of the stem," e.g. AI qiŋaq 'nose' + -ni 4s poss ⟶ qiŋani 'his own nose'. ("The term 'additive' does not imply that nothing happens at the boundary, cf. the truncation phenomena dealt with above.") Gemination may be triggered by the additive suffixation process, e.g. niġi- 'eat' + -vik 'place' ⟶ niġġivik 'table' (lit., 'eating place').

Replacive suffixation conditions a "radical modification" of stem and suffix. For example, qiŋani 'his own nose' has the alternative form qiŋŋi where, "to a first approximation the suffix. . . may be said to replace the final part of the stem" (Rischel 1974:192). The form qiŋŋi shows gemination of the medial stem consonant.

Lastly, gemination is found in what Rischel calls

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3. See Rischel (1974:191-192) for an explanation of suffixation types.

anaphoric or demonstrative forms, such as AI pavva 'up there' versus pavani 'located up there' and amma 'over there' versus amani 'located over there'.

We will proceed to discuss the three categories of forms which exhibit gemination, exemplifying and discussing each for the dialects at hand, while seeking to form a comprehensive analysis which might encompass the various sorts of gemination being examined.

6.2 Gemination preceding additive suffixes

Several additive suffixes, including verbal inflections, govern gemination in stems to which they are affixed. Gemination usually depends in some way upon the final segment of the stem and does not occur categorically before a certain morpheme, as exemplified by the following:

(132) -(i)t plural (N-N) See Section 6.211 for more data and discussion.

Stem		Inflected form
nuna	'land'	nunat
qayaq	'kayak'	qayyat
savik	'knife'	saviich
aivĭq	'walrus'	aivġich
kamĭk	'boot'	kamŋich

(133) -(u)m relative case, sing. (N-N)

nuna	nunam
qayaq	qayyam
savik	savium
aivĭq	aivġum
kamĭk	kamŋum

(134) -(i)n absolutive possessive, 2s-3s (N-N)

nuna	nunan
qayaq	qayyan

savik	saviiñ
aivĭq	aivġiñ
kamĭk	kamŋiñ

(135) -mik modalis case, sing.

nuna	nunamik
qayaq	qayyamik
savik	savigmik
aivĭq	aiviġmik
kamĭk	kamigmik

and similarly for -nik modalis case, pl. and other noun case inflections.

(136) -vik 'place, time' (V-N)

Stem		Derived form	
niġi-	'eat'	niġġivik	'table'
iga-	'cook'	iggavik	'kitchen'
mitchaaq-	'land'	B mitchaaġvik	'landing strip'
siñĭk-	'sleep'	siñigvik	'bed'
B aqpat-	'run'	B aqparvik	'race track'
miṭ-	'land'	K mirvik	'landing strip'

(137) -iñ/-tin imperative, 2s

		Inflected form	
niġi-	'eat'	niġġiiñ	
iga-	'cook'	iggaiñ	
mayuq-	'climb'	mayuġiñ	
siñĭk-	'sleep'	siñigiñ	
B aqpat-	'run'	B aqpattin	
makĭt-	'stand up'	makittin	

(138) -(r)uŋ imperative, 2s-3s

niġi-	'eat'	niġġiuŋ
iga-	'cook'	iggauŋ
mayuq-	'climb'	mayuġuŋ
tautuk-	'look'	tautuguŋ
B aqpat-	'run'	B aqparruŋ
makĭt-	'stand up'	makirruŋ

(139) -nak negative imperative, 2s[4]

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4. The -nak ending regularly triggers gemination in vowel-final stems, but only a very few speakers use gemination in stems which end in ĭ, the case in which vowel alternation must occur, cf. atĭkkunak or atiġinak 'don't put on your parka!' from /atiġĭ + nak/ or suppunak, supinak 'don't blow!' from /supĭ + nak/.

niġi-	'eat'		niġġiñak
iga-	'cook'		igganak
mayuq-	'climb'	B	mayuġnak
		K	mayuqnak
tautuk-	'look'	B	tautugnak
		K	tautuknak
B aqpat-	'run'	B	aqpannak
makït-	'stand up'	B	makinnak
		K	makitnak

(140) -nagu negative imperative, 2s-3s (This ending triggers gemination in Kobuk, although not generally in Barrow.)

niġi-	'eat'	B	niġiñagu
		K	niġġiñagu
iga-	'cook'	B	iganagu
		K	igganagu
mayuq-	'climb'	B	mayuġnagu
		K	mayuqnagu
tautuk-	'look'	B	tautugnagu
		K	tautuknagu
makït-	'stand up'	B	makinnagu
		K	makitnagu

(141) -(u)t(ï) 'instrument for' (V-N) or 'do for, with' (V-V)

niġi-	'eat'	niġġiñ 'eating utensil'
		niġġisigaa 'eats with it'
iga-	'cook'	igyan 'cooking utensil'
		iggatigaa 'cooks with it'
aglak-	'write'	aglaun 'pencil'
		aglautigaa 'writes with it'
imïq-	'drink'	imġun 'drinking glass'
		imġutigaa 'drinks with it'
tuqut-	'kill'	tuqurrun 'means for killing'
		tuqurrutigaa 'kills with it'

(142) -k dual (N-N)

nuna	'land'	nunak or nunnak
qayaq	'kayak'	qayyak
savik	'knife'	savvik
aivïq	'walrus'	aivvak
kamïk	'boot'	kammak

(143) -g (nominal) 'result of action' (V-N)

sana-	'carve'	sannaq 'chip of wood left over from carving process'
qupï-	'cleave'	quppaq 'cleft'

titïq-	'make a mark'	tittaq 'mark'
savigaq-	'cut wood, baleen into strips'	savikkaq 'one such strip'
saluk-	'be thin'	salluq 'a thin person, animal'
piɬak-	'butcher'	piɬɬaq 'piece of a butchered animal'
avïk-	'halve'	avvaq 'half'

(144) -ġtu- 'do excessively' (V-V)

niġi-	'eat'	niġġiqsuruq 'eats too much'
siñĪk-	'sleep'	siññaqturuq 'sleeps too much'
savak-	'work'	savvaqturuq 'works too much'

Presenting gemination as a process with synchronic phonological conditioning proves difficult in light of the fact that given two suffixes of a similar shape, one may be found to govern gemination and the other not. For example, the nominalizer -vik 'place' is shown above to trigger gemination in vowel-final stems, while the absolutive possessive suffix -vuk (1d-3d,p) does not, cf. nunavuk 'our$_2$ lands'.

From the above data may be extracted certain generalizations which should serve to illuminate the problem even if they do not provide a neat solution to it. Inupiaq suffixes are classified generally as truncating or non-truncating with regard to whether they delete or keep the final consonant of a stem to which they are affixed. Of interest here, these two classes of suffixes appear to behave differently as far as gemination is concerned. Non-truncating suffixes -- -vik 'place', -nak neg imp, -ta opt 1p, etc. -- may govern gemination in vowel-final stems but not elsewhere. The other suffixes which trigger gemination above may be seen as selectively truncating since

they cause deletion of some stem-final consonants and not others, e.g. ammimik 'skin' mod sg from /amiq + mik/ but saviqmik 'knife' mod sg from /savik + mik/. The nature of selective truncation is taken up below. In any case this type of suffix appears to condition gemination only when truncation has occurred and therefore precisely not in vowel-final stems.

Apparently, then, if the suffixes we have classified as additive condition gemination in vowel-final stems, they fail to do so in consonant-final stems; generally speaking, the converse of the above also seems to hold, and a suffix which conditions gemination in consonant-final stems fails to do so in vowel-final stems.

Before discussing the gemination process itself any further, we find it worthwhile to probe the behavior of the class of suffixes which conditions gemination referred to here as selectively truncating.

6.21 Selectively truncating suffixation

While most truncating suffixes cause a stem-final consonant to vanish completely, the selectively truncating ones are considered to cause the deletion of some stem-final consonants and not others, taking into account that an undeleted consonant may be lost by a mechanism not resulting from suffixation. These are suffixes which distinguish between stem consonants in ways which correspond neither to the phonetic reality of those consonants nor to their habitual behavior elsewhere.

Characteristic of selective truncation are the noun case endings which trigger deletion of only some uvulars and no velars. Therefore, the paradigm contains forms like ammimik 'skin' mod sg with deleted stem-final q, but aiviġmik 'walrus' mod sg, saviġmik 'knife' mod sg, and natchiġmik 'seal' mod sg where the final consonant of the stem persists in assimilated form following suffixation.

Representative of other selectively truncating suffixes, we find the plural morpheme, whose pattern of allomorphy depends in some way upon the stem-final segment which precedes, although the conditions for allomorphy are not always clear from surface phonological evidence (see 6.211).

To begin with, the question of selective truncation is a classical problem of Eskimo linguistics which occurs throughout the Eskimo languages and has been discussed in the literature. The problem, in brief, is that two "types" of q appear morpheme-finally and while phonetically identical, exhibit different morphophonemic behavior. Schultz-Lorentzen (1945:25) writes, "Some words with a final q behave in the same way [as nouns ending in k]," which accurately describes the phenomenon, since some q's, along with almost all k's,[5] are not subject to deletion before selectively

5. Rischel (1974:282) points out that there exists "a minor group of nouns in C_k which behave like stems in C_q," i.e. stem-final k undergoes selective truncation in forms like WG isigak/isikkat 'foot, sg and pl' and ujaRak/ujaqqat 'stone, sg and pl'. Evidence for this category

truncating suffixes such as the plural and relative case endings described by Schultz-Lorentzen. The staff of the Alaska Native Language Center have used the term 'strong g' for this same phonological entity, and we abbreviate it here as Q, with the understanding that Q is not phonetically different from g and is used only for ease of reference.

The reason that the g/Q distinction figures so prominently in the literature on Eskimo, especially that on West Greenlandic, is probably that it is crucial to a solution of several categories of nominal inflection, viz. the plural, relative singular, and the oblique noun case inflections. Pluralization is one of the most often discussed issues of Eskimo phonology and is indeed of great linguistic interest. Some of the thorniest problems of Eskimo lie right within the plural paradigm, and scholars may have tended to devote an inordinate amount of attention to these before investigating pertinent and enlightening phenomena

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(5, continued)

of nouns exists also in Alaskan Inupiaq, since some older speakers use isikkan 'your foot' (/isigak + n/) instead of the modern isigaiñ, and ikutchiñ 'your elbow' (/ikusik + n/) for ikusiiñ. We cite also the following hapax legomena forms from Edith Tegoseak: kiatchiñ 'your scapula' (/kiasik + n/) for kiasiiñ and utkutchich 'cooking pots' (/utkusik + t/) for utkusiich.

A possible explanation for certain of these exceptional forms lies in the probability that some singular nouns with final k may actually be conventionalized duals deriving from an original g-final stem, cf. CY itgaq and AI isigak 'foot', CY aixaq and AI argak 'hand' (argan or argaiñ 2s poss), where the Inupiaq forms behave as if g-final.

from elsewhere in the language, resulting in a somewhat unrealistic, or perhaps unbalanced, picture of Inupiaq phonology.

Gemination, for example, may be found in plurals and must be treated early if we begin our phonology there. The metathesis-assimilation solution mentioned at the beginning of this chapter could only be proposed by someone unfamiliar with gemination phenomena found elsewhere in the language. The mysterious vowel alternations found in the plural, -(i)t, and the relative singular, -(u)m, lead to the writing of epenthesis rules (see 6.213) which operate nowhere else and possibly to the derivation of these vowels from underlying I or schwa for which there is no Eastern Eskimo evidence.

A great many Inupiaq suffixes exhibit allomorphy for which no one proposes a synchronic phonological account; the plural and relative case morphemes seem to deserve the same treatment as the others, but may have been granted a more prominent status because of an emphasis placed on nominal morphology.

Given that many of the "rules" needed to derive plurals are barely operative elsewhere in Inupiaq phonology, or not at all, the problem may appear to be historical in nature. Yet this answer too appears to beg the question, since the system governing plurals and related noun inflections remains fully functional long after the original

phonological motivation behind some of the processes has disappeared. We are up against the problem of synchrony versus diachrony, and the question of two kinds of q is an interesting case in point: a synchronic difference in phonological behavior attests to an archaic contrast -- probably Proto Eskimo given its presence throughout the Eskimo languages -- between two entities today surfacing only as [q].

Due in part to tradition, no account of Eskimo phonology would be complete without a discussion of pluralization. Interesting problems abound within the plural paradigm, although they often appear to be rooted in archaic stages of the language and should not be considered central problems of synchronic phonology. If the succeeding section reworks a familiar problem, it at least deals with Alaskan data which represent a more conservative form of Inupiaq than West Greenlandic in many respects and may thus add new insight to the issue.

6.211 Pluralization in nouns

The behavior of the plural suffix is characteristic of a small group of nominal suffixes, including the relative case singular -(u)m and the 2s-3s possessive inflection -(i)n. Once noun plurals are analyzed, these other related morphemes can be easily examined in light of the former. Plurals can best be considered in terms of classes based on stem types, each of which conditions similar allomorphy in the suffix. These morphological classes may eventually be

integrated into a single system by means of phonological and morphophonemic rules.

1. Singular nouns ending in a vowel form their plural simply by adding -t, which is regularly subject to palatalization following /i/.

(145)	Singular		Plural
	nuna	'land'	nunat
	anu	'harness'	anut
	inĭ	'place'	init
	qargi	'men's house'	qargich

Nouns ending in n fall into this class as well, since this n is derived from a final underlying /tĭ/ (see 4.51). Thus, the plural of aŋun /aŋutĭ/ 'man' is aŋutit. Gemination is absent in this noun class.[6]

2. Singular nouns ending in a vowel other than ĭ plus a weak consonant, i.e. ġ (and only ġ), have this consonant deleted by the plural morpheme with subsequent gemination of a preceding medial consonant. If there is a preceding cluster or long consonant, gemination cannot apply.

(146)	qayaq	'kayak'	qayyat
	amiq	'skin'	ammich
	aġnaq	'woman'	aġnat
	nanuq	'polar bear'	nannut
	amaġuq	'wolf'	amaqqut (from /amaquq/)

If the last vowel of the word is long or a diphthong, a geminate consonant may appear between the two vowels: asiaq 'berry', plural asirrat (or asiat). A consonant preceding a long vowel or vowel cluster never geminates in the plural.

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6. Occasional exceptions are possible, e.g. the plural of paa 'opening, door' may be paat or parrat.

Sometimes, no gemination is possible: umiaq 'skin boat', plural umiat.

3. A singular noun ending in a vowel other than ĭ plus a strong consonant, i.e. k or Q, has this consonant deleted and the expanded plural allomorph /it/ (ich) is found.

(147)	savik	'knife'	saviich
B	iqaluk	'fish'	iqaluich
K	qaluk	'fish'	qaluich
	mannik	'egg'	manniich
B	qaugak	'duck'	qaugaich
	natchiQ	'seal'	natchiich
	avvaQ	'half'	avvaich

Gemination upon pluralization is never found in this class, and in some cases gemination has already applied.[7]

4. Singular nouns ending in ĭ plus a consonant, which is necessarily strong in this position, form their plurals by addition of the expanded form of the plural suffix, -ich. Syncope of ĭ occurs where the environment permits, and the resultant consonant cluster is adjusted by progressive assimilation. Gemination is never found in this class.

(148)	ivĭk	'grass'	ivgich
	kamĭk	'boot'	kamŋich
	aivĭq	'walrus'	aivġich
	atĭq	'name'	atqich
	aġvĭq	'whale'	aġviġich
B	punnĭq	'loaf'	punniġich

An examination of these plural nouns raises two major problems concerning phonological behavior which is not

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7. As mentioned in Section 4.22 and explicated in Section 6.212, instances of final Q govern gemination in stems which have a penultimate segment other than ĭ.

easily explained in terms of processes familiar elsewhere in the language. First, we find that nouns ending in strong consonants, viz. k and Q, take the expanded plural allomorph -ich, while stems in vowel or q take simply -t. Strong consonants are those consonants which resist deletion before some suffixes, e.g. the oblique noun case endings, and may condition the expanded allomorph of others, e.g. plurals. This analysis gives rise to the following questions: 1) What characterizes a strong consonant other than its morphophonological behavior and why does it behave differently from other consonants? and 2) How does the expanded plural allomorph alternate with -t?

The simplest plural formation process takes place in vowel-final stems which simply add -t. We accept -t as the basic form of the plural morpheme, since if we were to take the allomorph -ich (/it/), it would be necessary to write an unnatural rule to delete the i in */nunā + it/ to give nunat 'lands'.

The -t allomorph is found again with Class 2 nouns, only now truncation of the final weak q takes place with subsequent gemination of a single medial consonant, hence nanuq 'polar bear', nannut plural. The only possible difference between Classes 1 and 2 which might condition gemination is the deletion of the stem-final consonant.

However, in Class 3 the stem-final consonant is also deleted, and gemination does not occur. If the final consonant of nanuq 'polar bear' and savik 'knife' are both

said to be truncated in the same manner by the plural suffix, we are at a loss to account for the disparity in the form of the plural morpheme found with each, i.e. nannut but saviich.

Just as the ġ of nanuq is absent before the oblique noun case suffixes (nannumik) while the k of savik is not (saviġmik), linguists have assumed that k is not truncated by the plural suffix but must undergo some other form of deletion (see Rischel 1974:214-215, Underhill 1976b:243-245).

In fact the assumption that final velars similarly resist truncation before the plural suffix provides an environment where epenthesis could take place naturally to break up the disallowed final cluster and give the expanded plural allomorph: /savik + t/ → /savikit/. The epenthesis rule is considered below in all possible instances of its application. At this point we should like to complete the derivation of saviich by means of the velar deletion rule presented in Section 5.332, and which is used by Underhill in his solution to the same problem (1976b:246).

The consonant gradation system we have discussed above does not, however, indicate deletion of a velar stop intervocalically but rather lenition to a voiced fricative giving *saviġit instead of /saviit/, that is, saviich.

Class 4 plurals help to elucidate the problem. Atĭq 'name' becomes /atĭqt/ upon suffixation of the plural morpheme. Assuming resistance of the strong C to truncation, cf. atiġmik mod sg, epenthesis must apply giving /atĭqit/. The environment for syncope is met (/atqit/) and

palatalization gives the correct plural atqich.

The case of aġvĭq 'whale' is similar except that the environment for syncope is not met, due to the presence of a medial cluster (/aġviqit/). Instead, q lenites to give aġviġich, with palatalization of final t. The derivations of the plurals of natchiq 'seal' and aġvĭq 'whale' run parallel, except for a final step which deletes the intervocalic ġ of /natchiġich/ to give natchiich, but not that of aġviġich. The only possible phonological conditioning for such a difference must lie in the presence of ĭ in aġvĭq which blocks deletion of a following velar or uvular, while i in natchiq conditions deletion.

The synchronic rule of velar deletion is necessarily divergent from what we have discussed in diachronic terms. In Chapter V, we presented the evidence for stem-internal velar deletion and concluded that it should be viewed as an historical process, since it occurs in only a limited number of cases. Morpheme-finally, velar deletion remains productive as in the plural cases just discussed. In historical terms the fact that stem-final velars and uvulars undergo the deletion rule argues very strongly for these consonants being fricatives underlyingly, since stops are normally subject to lenition but not deletion between vowels.

As explained in Section 1.22, non-nasal morpheme-final consonants are posited as underlying stops out of convenience, since they appear as stops when followed by a pause, and although they could be posited as continuants with

equal success if the relevant rules are rewritten to handle this change. Historically, these morpheme-final consonants are probably fricatives as suggested by Central Yupik, where they must be treated as [+ continuant] (see Reed et al. 1977) and now by the evidence for velar deletion in plurals.

If we recognize a clear separation between synchrony and diachrony, however, we need alter neither our underlying forms nor our velar deletion rule. The system of consonant gradation, which causes the problem by failing to account for deletion of intervocalic stops, has been discounted as not synchronically viable in a majority of cases. If we look only at instances of velar deletion found morpheme-finally, nothing prevents us from writing a general rule to delete intervocalic velars preceding a morpheme boundary.

Rule 14 Velar deletion at morpheme boundaries

$$\begin{bmatrix} C \\ +\ back \end{bmatrix} \longrightarrow \emptyset / C \begin{bmatrix} V \\ \langle -\ high \rangle \\ \langle +\ back \rangle \end{bmatrix} _____ +V$$

The above rule serves our goal of accounting for the derivation of <u>saviich</u> 'knives' from /savik + t/ and <u>natchiich</u> 'seals' from /natchiq + t/, assuming a rule of epenthesis, and further accounts for the retention of the uvular intervocalically in <u>aġviġich</u> 'whales'.

Of the equivalent problem as it occurs in West Greenlandic, Rischel (1974:208) says, "The preservation of stem final consonant segments before inflectional suffix vowels is indisputably found in WG, but it is of highly

limited distribution." He goes on to demonstrate that no regular pattern of deletion of intervocalic stem-final consonants can be determined. Rule 14 is probably historically correct for all of Inupiaq, yet its synchronic motivation is far greater for Alaskan Inupiaq than for the eastern dialects, i.e. WG, where forms to which this rule has applied appear to stand as lexicalizations which cannot be derived by any sort of general phonological rule. Even in Alaska, where Rule 14 applies regularly to categories such as plurals, there are other groups of forms which appear exceptional to the rule. 1s-3s possessives, for example, such as amiġa 'my skin' and saviqa 'my knife', which do not contain ĭ, retain stem-final intervocalic velars. The possessive suffix involved here is -ka 1s, and it seems likely that the suffix-initial C in some way blocks the application of Rule 14.

A synchronic rule of lenition will be needed in cases where ĭ blocks the velar deletion process in forms such as aġviġich from /aġvĭq + t/.

Rule 15: Lenition at morpheme boundaries

$$\begin{bmatrix} C \\ +\text{back} \\ -\text{continuant} \end{bmatrix} \longrightarrow \begin{bmatrix} +\text{continuant} \\ +\text{voice} \end{bmatrix} \quad /V___+V$$

Lenition and velar deletion are not crucially ordered with respect to each other since if lenition applies first to all stem-final velars, those not preceded by ĭ will be subsequently deleted by velar deletion giving the correct

result. If deletion applies first, lenition will apply only to velars preceded by I which have failed to delete, also correct.

6.212 Weak versus strong consonants

Thus far we have succeeded in describing the effects of strong consonants within the plural paradigm, finding them exempt from truncation, but subject to velar deletion unless preceded by I. This solution is equivalent to Rischel's which contains a Complex cluster adjustment rule (1974:214-215) which deletes the final consonants of stems marked for its application, i.e. those with final weak consonants, when a consonant-initial ending follows. If this rule applies, gemination may be present, if not, "the stem final consonant is preserved, and if the resulting cluster is word final, it is broken up by vowel epenthesis. After this the stem-final consonant may vanish by prevocalic deletion. . ." (e.g. AI savik 'knife', saviich plural).

Any solution proposed for pluralization depends on a distinction between strong and weak consonants, the former being those which fail to trigger Rischel's Complex Rule. As to predictability of these consonants, k may be said to be strong in Alaskan Inupiaq, with a very few exceptions (see note 5). Distinguishing g from Q based on surface phonetic criteria, we agree with Rischel and Underhill that a morphological marking must be used to distinguish stems in g from those in Q synchronically.

Otherwise, we find Underhill's (1976b:243-245) discussion of the two types of q unenlightening. He considers the possibility of treating the q found in (WG and AI) aRnaq 'woman', aRnat pl, as a singular marker while the final q of (WG and AI) suqqaq 'whalebone', WG suqqaat pl (AI suqqaich) "seems to function as a genuine part of the stem." While the association of stem-final q with singular is certain in Eskimo, it is not clear that the q of aRnaq is any less bound to the stem than that of suqqaq. In fact there is evidence that the strong Q, which Underhill says behaves as part of the stem,[8] may in many cases be an independent formative. The nominalizing suffix -q (see forms of (143)), for example, is found in avvaq 'half' from avīk- 'to halve' + -q 'result of, nom'. That this q is strong is demonstrable through inflection: avvaġmik 'half' mod sg, avvaich pl. The Greenlandic cognates avik- 'to halve' and affaq 'half' indicate a comparable analysis for that language.[9]

Underhill distinguishes the two q's "notationally" by writing final /q/ in aRnaq and /R/ (that is, AI ġ) in

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8. When Underhill says that in some cases q behaves as a "genuine part of the stem", we understand him to mean that q is not in these cases a separate morpheme.

9. Schultz-Lorentzen's dictionary (1927:1) gives the spelling 'agfaq' for [affaq] with a consonant cluster which suggests that syncope has applied to avīk-, followed by consonant metathesis. This implied derivation is probably false, since Alaskan evidence indicates the ff in WG to be due to gemination of v -- with predictable devoicing -- conditioned by the suffix -q.

suqqaq, much as we have adopted the mnemonic ɢ and Q. This so-called notational distinction, however, appears in underlying representations and provides the basis on which his rule of "Q-deletion" may operate on aRnaq and not suqqaq. This solution is at variance with Underhill's previous statement, with which we agree, that the "best approach in the modern language would be to treat stems like suqqaq as exceptions, marking them by some exception mechanism such as lexical features."

Whereas strong consonants are best treated as exceptions synchronically, it is interesting to speculate as to the original phonetic distinction which must have once separated ɢ from Q. Although pertinent evidence does not suggest an obvious reconstruction of this difference, the evidence is consistent with other facts of the language, suggesting possible hypotheses.

First, strong consonants have been seen to be resistant to deletion in some environments where weak consonants are not, i.e. preceding selectively truncating suffixes. Nonetheless, the majority of truncating suffixes do not select between weak and strong consonants:

(149) -nĪk- 'to acquire' (N-V)

atigĪ	'parka'	atiginik-	'acquire a parka'
qayaq	'kayak'	qayanik-	'acquire a kayak'
savik	'knife'	saviñik-	'acquire a knife'
piñĪQ	'insole'	piñinik-	'acquire an insole'

Second, stem-final strong ɢ is closely associated with gemination of a preceding medial consonant. In the

case of the nominalizing -ġ morpheme, strong Q can be shown to trigger gemination directly, cf. avĪk-/avvaQ. Other instances of stem-final Q are still preceded by a stem-internal cluster or long consonant, even if the Q is not analyzable as a separate morpheme, and no alternation between a single C and a geminate is present.

(150)	natchiQ	'seal' (cf. CY nayiQ)
	maġġaQ	K 'mud', B 'sand'
	ḳutchuQ	'gum, sap'
B	apuyyaQ	'snow patch; snow house'
K	aputyaQ	'snow patch'
B	aviŋŋaQ	'lemming'
K	aviññaQ	'lemming'
PB	aviñŋaQ	'lemming'

Exceptions are present although rare. Kobuk auraq 'summer' indicates final Q in the oblique noun cases (auraġmi 'in the summer'); gemination is absent before this Q, although this is not surprising, since we have already observed that the medial consonant of this stem consistently resists gemination (see 5.343). The single exception then is a place name, Tikiġaq 'Point Hope', Tikiġaum rel, Tikiġaġmi loc, showing a definite final Q.[10] The other strong consonant, k, is not associated with stem-internal gemination or consonant clusters.

The relationship of strong Q to gemination brings us back to the original point of this chapter which is to characterize and account for consonant gemination. Since

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10. K tikiġaq 'thicket, forest', tikiqqam rel sg, ends in weak q, providing a minimal pair with TikiġaQ 'Point Hope'.

the range of evidence relating to gemination is much greater than that for strong versus weak consonants, we shall proceed with our examination of gemination in hopes that our findings may shed further light on the underlying status of strong consonants, which will be considered finally when the discussion of gemination is complete.

6.213 Vowel epenthesis with suffixes consisting of a single consonant

Assuming strong consonants not to undergo the truncation rule before certain consonant-initial suffixes, we have yet to characterize the epenthesis rule which is responsible for the expanded form of the plural suffix, -ich. There are two other similar cases of epenthesis in Inupiaq, and these occur with suffixes whose behavior is similar to that of the plural in that they consist of a single consonant and are selectively truncating. These are the relative case singular inflection -(u)m and the 2s-3s absolutive possessive inflection -(i)n (i.e. n/iñ).

Given the highly restricted nature of the epenthesis process, it would seem satisfactory to write a morphological rule where the quality of the inserted vowel is determined by the type of ending involved, i.e. relative, plural, etc. This solution lacks, however, any degree of phonological elegance and does not rely on the interesting fact that the epenthetic vowel is u before a labial consonant and i before an alveolar. Rischel (1974:231) writes an epenthesis

rule which takes this correspondence into account in the following "provisional rule formulation":

$$\emptyset \rightarrow \begin{bmatrix} V \\ +\text{ high} \\ \alpha\text{ round} \end{bmatrix} \; /C____ \begin{bmatrix} C \\ \alpha\text{ labial} \end{bmatrix} \;]$$

where "]" is a phonological word boundary. In addition, "the vowel must be spelled out as front if it is non-round, etc."

An historically tempting solution to epenthesis but one which we feel has no synchronic reality involves the insertion of I or schwa in these cases with a later adjustment of the vowels to their actual values by assimilation to the following consonant. Support for such a solution is the occurrence of schwa in Yupik with these morphemes, cf. CY aRveq 'whale', aRveRet pl, aRveRen 'your whale', aRveRem rel. Besides, I is often syncopated in Inupiaq and it seems fitting that this should be the epenthetic vowel as well. While the Inupiaq epenthetic vowels may derive from schwa historically, Eastern Eskimo gives no evidence for this process, and there is no synchronic reason to accept an analysis of this nature.[11]

Moreover, epenthesis of I creates problems in forms such as aġviġich 'whales' where final palatalization is present. If epenthesis were to apply to an underlying

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11. Stephen Anderson (1974:179) derives the epenthetic vowel of the West Greenlandic relative case marker -(u)p (AI -(u)m) from schwa. Michael Krauss has proposed this analysis as well (personal communication).

structure /aġvĭq + t/, the stage /aġvĭġĭt/ would result, assuming an application of lenition, Rule 15. The penultimate vowel ĭ would then be readjusted to /i/ based on the succeeding alveolar consonant, and lastly palatalization of the final consonant would occur based upon the presence of a preceding /i/. While the correct plural and 2s possessive forms could be arrived at by this sequence of rules, it is difficult to see how other occurrences of ĭt could be excepted from undergoing the same vowel adjustment and palatalization processes. For example, forms such as timit 'bodies' /timĭ + t/ and timin 'your body' /timĭ + n/ contain final sequences of ĭ plus an alveolar, which would end up as -ich and -iñ by the processes discussed above. Makit- 'stand up', aŋutit 'men', and makittin 'stand up!' all contain similar final sequences. To except them from the adjustment to /i/ of their penultimate segment would require that the vowel adjustment rule apply only to epenthetic vowels, i.e. before the plural, relative singular, and 2s possessive inflections.

6.22 The (u)t(ĭ) suffixes

Morphemes whose behavior is interesting in that they condition gemination and resemble the plural in some respects are the instrumental nominalizer and a morphologically identical verbal suffix meaning 'do with or for'. Bergsland gives the form of these morphemes as -(u)t(ĭ), since only the t need be present, but it may be flanked

by one or both vowels. As explained in Section 2.312, a final /tĪ/ becomes n through minor rules of apocope and nasalization.

With vowel-final stems, the tĪ allomorph of these suffixes is generally found, accompanied by gemination, giving iqqan 'cooking utensil', iqqatit pl, iqqatiqaa 'cooks for him, with it' from iqa- 'to cook' +-(u)t(Ī)-. With Ī final stems, the full form of the suffix apparently occurs: suppun 'gun' from supĪ- 'to blow' + -(u)t(Ī)- instr and B tiŋŋun 'airplane' from tiŋĪ- 'to take flight' + -(u)t(Ī)- instr. We have pointed out (see 4.32) two possible analyses for the presence of u in these forms: as Rischel suggests, stem Ī may be syncopated and the full form of the morpheme appear, which may be historically correct and the only reasonable solution for West Greenlandic. Otherwise, the Ī/u vowel alternation, which we have proposed for Alaskan Inupiaq imperative verb forms may be operative, changing the stem-final Ī to u following gemination.

The instrumental suffix triggers gemination only in vowel-final stems, and yet there occur instrumental nominalizations based on vowel-final stems which have no gemination: apun 'snow lying on the ground' from apĪ- 'to be snow-covered', kigun 'tooth' from ki(g)Ī- 'to bite', ikun 'match' from ikĪ- 'to burn', saputit (sapun sg) 'weir' from sapĪ- 'to block', and aŋun 'man (male)' from either aŋu- 'to catch' or aŋĪ- 'to be big'.

The best explanation for these exceptional forms is that they predate the Inupiaq gemination rule and have ceased to be derived by synchronic phonological rule. In fact, aŋun 'man' and kiġun 'tooth' are pan-Eskimo words whereas forms showing gemination, e.g. suppun 'gun' and tiŋŋun 'airplane' are generally more restricted in their occurrence.

Aŋun is an interesting case since it may be derived from two possible sources. A modern nominalization of aŋu- 'to catch' is K aŋŋun 'game animal' with gemination. If 'man' is also derived from aŋu-, these forms are doublets separated by the advent of the gemination rule. A derivation of 'man' from aŋĭ- 'to be big' is, however, entirely plausible and would be comparable to that of apun 'snow on ground' from apĭ-.

Verb stems ending in k or ġ condition the expanded allomorph of the instrumental morpheme, e.g. atuun 'song', atuutit pl, from atuġ- 'to sing' and aglaun 'pencil' from aglak- 'to write'; stems with penultimate ĭ are subject to syncope while retaining their final consonant, e.g. imġun 'drinking glass' from imĭġ- 'to drink'.

This system is in many ways reminiscent of the plural paradigm. Verb stems such as atuġ- may be analyzed as possessing final strong consonants, which resist truncation, conditioning the expanded form of the suffix and are subsequently lost by means of velar deletion, except when preceded by ĭ, as in imġun 'drinking glass'.

The behavior of the two morphemes contrasts, however, since the instrumental suffix governs gemination in vowel-final stems, which the plural does not, and verb stems in t give evidence for an instrumental suffix-initial consonant: tuqurrun 'means for killing' from tuqut- 'to kill' (see 4.42). These divergences in the behavior of the two suffixes justify a different treatment of them. The instrumental cannot be treated simply as tï with an epenthetic u -- as the plural is t with an epenthetic i -- since the suffix-initial C of tuqurrun could not then be accounted for. In addition, gemination in plurals was found to be dependent on deletion of a stem-final consonant. If our explanation of gemination is to depend on the loss of some segment, we must prefer to consider the instrumental suffix as -(r)(u)t(ï), or even -(u)t(ï), with loss of the initial segment(s) following vowel-final stems.

6.3 Replacive suffixation and gemination

Replacive suffixation functions in much the same manner in Alaskan Inupiaq as described by Rischel for West Greenlandic (1974:191-197). Essentially, certain additive type truncating suffixes, invariably with an initial alveolar (l or n) allow alternate forms characterized by deletion of the last vowel of the stem and the suffix-initial consonant, and subsequent gemination of a medial stem consonant. The process of replacive suffixation results in a series of doublets (see also 3.7):

(151) kamik + -li- + -tuq → kamiliruq or kammiruq
'boot' 'make' 3s int 'makes boots'

qayaq + -li- + -tuq → qayaliruq or qayyiruq
'kayak' 'makes a kayak'

kamik + -liuq- + -tuq → kamiliuqtuq or kammiuqtuq
'boot' 'make' 'makes boots'

imiq + -liuq- + -tuq → imiliuqtuq or immiuqtuq
'water' 'makes water' (i.e. from ice)

When the last vowel of a stem is long or a diphthong, a deleted intervocalic consonant may emerge in geminate form:

(152) kikiak + -liq- + -tuq → kikialiqsuq or kikirriqsuq
'nail' 'provide' 'is provided with a nail'

unipkaaq + -liq- + -tuq → unipkaaliqsuq or unipkarriqsuq
'legend' 'is provided with a legend'

An underlying long vowel or diphthong which does not result from deletion of an intervocalic continuant will show no geminate consonant:

(153) uniat + -li- + -tuq → unialiruq or uniiruq
'sled' 'make' 'makes a sled (but cf. K unirrat 'sled')

umiaq + -li- + -tuq → umialiruq or umiiruq
'boat' 'makes a boat' (but cf. B umiġġiq- 'get a whaling crew')

While umiiruq shows no geminate and is thus consistent with the plural umiat 'boats', where gemination should also be possible, umiġġiqsuq 'gets a whaling crew' shows a geminate. If this form is a lexicalized doublet of umialiqsuq 'is provided with a boat', then the stem umiaq behaves irregularly with regard to replacive suffixation

and gemination. Otherwise, umiġġiqsuq may be the result not of replacive suffixation but of a derivational process which is not immediately apparent.

Some forms derived by replacive suffixation have a meaning which is not simply the sum of the formatives involved and the corresponding string with additive suffixation is not equivalent in meaning. For example, iññiqsuq 'has visitors, lit. is provided with people' (/iñuk + liq + tuq/) would not be said iñuliqsuq although the two are supposedly equivalent.

Replacive suffixation does not apply to stems with a final vowel, so that iglulirug 'builds a house' cannot be *igliruq. Stems having the structure CCV(C)#, however, are subject to replacive suffixation, although gemination is not possible since there is already a medial cluster, e.g. kuvri- 'make a net' from /kuvraq + li/ and probably iġñi- 'give birth' from iġñiq 'son' + li 'make'.

Rischel finds that formations showing replacive suffixation are "obviously lexicalized" and does not attempt to set up rules to account for them (1974:290). This approach seems to be justified for Alaskan Inupiaq as well, since there is a tendency for the additive and replacive doublets not to be equivalent, suggesting lexicalization. While rules can generate possible forms, irregularities in actual usage are sufficient to indicate treatment of these formations as non-productive.

While the replacive suffixes presented so far belong to the derivational morphology and are denominal in nature, there is one inflectional suffix which exhibits replacive behavior. The fourth person singular possessive morpheme -ni is normally additive and truncating, although replacive doublets are possible in many instances:

(154)

qanīq	+	-ni	⟶	qanini or qanni
'mouth'		4s poss		'his own mouth'
qiŋaq	+	-ni	⟶	qiŋani or qiŋŋi
'nose'				'his own nose'
putuguq	+	-ni	⟶	putuguni or putukki
'big toe'				'his own big toe'
kamīk	+	-ni	⟶	kamini or kammi
'boot'				'his own boot'

Nothing about the morphology of the fourth person suffix distinguishes it or suggests a possible phonological motivation for its replacive behavior. In fact the morphologically identical locative case plural inflection -ni is selectively truncating and may not trigger replacive suffixation.

The fourth person -ni is not found to trigger replacive suffixation regularly in all forms. As with other suffixes of this type, vowel ending stems are exempt from the replacive process, so that uluni 'her own semilunar knife' cannot be *ulli nor can igluni 'his own house' be *igli. Also, some consonant ending stems do not show a variant with replacive suffixation, e.g. argani (not *argi) 'his own hand' from /argak + ni/. Fourth person forms

showing replacive suffixation are sporadic, demonstrating that the process is no longer productive.

6.4 Demonstratives

The discussion of gemination has led from the more straightforward occurrences of the process conditioned by certain additive suffixes to cases of gemination due to replacive suffixation which are much less transparent synchronically. These latter instances, however, still appear to depend on the deletion of morphological material and thus bear some relation to our initial observations concerning a correspondence between gemination and truncation. Most opaque of all forms containing gemination are the demonstratives whose phonological behavior is unclear in many respects.

Frequently, demonstratives have a geminate which corresponds to a single consonant in related forms, usually inflected for case:

(155)

B pikka	'up there!' (referring to a restricted, visible object)
B pikani	'located up there
K pitcha	'up there!' (restricted, visible)
K pichani	'located up there'
amma	'on the other side of a barrier'(not
amani	'located thus' visible)
avva	'over there' (extended, visible)
avani	'located thus'
uvva	'here' (restricted, visible)
uvani	'located here'

Sometimes a geminate corresponds to zero, where a single

consonant has presumably undergone intervocalic deletion:

(156)

agga	'across there' (extended, visible)
aani	'located across there'
pagga	'up there' (extended, visible)
paani	'located up there'
marra	'here' (extended, visible)
maani	'located here'

The peculiarity of these forms is apparent when one realizes that gemination is found not in the inflected stems where it might be expected but in the demonstratives which seem to bear no suffix which might condition gemination. Other cases of gemination cited above are found in the environment of a suffix. The locative plural suffix -ni which often triggers gemination (cf. qayyani 'in the kayaks') does not do so in vowel-final stems (cf. nunani 'in the lands') which suggests /pika/ as the stem of pikani 'located up there', since a consonant-final stem (ending in q, not k) should have a geminate in the inflected form. The presence of the locative ni is puzzling in these forms in any event, since this form of the morpheme is used otherwise only with plurals and possessives.[12]

Forms containing gemination in the apparent absence of a suffix, e.g. pikka, have given rise to hypotheses of underlying forms containing stem plus suffix. Rischel

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12. Edna MacLean suggests (personal communication) that this ni is not the plural but the allomorph of the locative case ending found with possessives, cf. iraani 'in his eye' from /irĭ + a + ni/. Her treatment of demonstratives for Barrow contains much promising insight which we hope will become available in print.

(1974:294) suggests the possibility that these geminates may be due to replacive suffixation, so that the final vowel of pikka is suffixal rather than being the stem vowel of /pika/, although of the same quality. A similar analysis is suggested independently by Edna MacLean for Barrow Inupiaq (personal communication).

The Inupiaq demonstrative system remains puzzling and overall, little can be shown conclusively as to the status of gemination in these forms. Demonstratives thus contribute least to our overall understanding of gemination.

6.5 Analysis of gemination

The type of gemination under consideration is that which is responsible for alternation between short and long consonants morpheme-internally and neither underlying nor due to the coming together of two consonants at a morpheme boundary. Although a solution involving vowel-consonant metathesis has been suggested to account for geminates, we have discounted such an analysis as inadequate and propose instead that we are dealing with a true gemination process in the phonological sense.

A recapitulation of what the data presented above reveal about gemination will help form an overall picture of the problem at hand.

1) Gemination conditioned by additive suffixation falls into several categories:

a. Before the selectively truncating suffixes,

gemination depends on truncation of a stem-final consonant, e.g. ammich 'skins' from /amiq + t/, ammimun 'to the skin' from /amiq + mun/. If truncation does not occur, and although the stem-final C may disappear by velar deletion, gemination is not found, e.g. saviich 'knives' from /savik + (i)t/ and saviçmun 'to the knife' from /savik + mun/.

b. Gemination is found before some non-truncating suffixes in vowel-final stems only, e.g. iggavik from /iga + vik/ but siñigvik 'bed' from /siñĭk + vik/; and niġġiiñ 'eat!' from /niġi + (t)in/ but mayuġiñ 'climb!' from /mayuq + (t)in/.

c. A small class of suffixes always conditions gemination, e.g. -q 'result of nom' in avvaq 'half' from /avĭk + q/ and -qtu- 'overdo' in siññaqturuq 'sleeps too much' from /siñĭk + qtu + tuq/. The dual -k triggers gemination regularly in all noun stems except those with a final vowel where gemination is optional, e.g. inik or innak 'places$_2$' from /inĭ + k/ (see below).

2) A limited group of additive truncating suffixes may also undergo replacive suffixation, and resultant formations regularly contain gemination, e.g. kamili- or kammi- 'to make boots' from /kamĭk + li/.

3) Demonstratives may contain geminates which alternate with single consonants in related forms, e.g. B ikka 'there' but ikani loc.

Taken as a whole, the case for sorting forms containing gemination into categories according to synchronic phonological criteria appears weak indeed. While sections of the data share common properties as regards gemination, if our organization is meaningful, there seems to be no connection between some of the categories or even apparently conflicting environments for gemination in certain cases. For instance, while selectively truncating suffixes in 1a. show gemination following truncation and thus never in vowel-final stems, the suffixes of 1b. are non-truncating and govern gemination only in vowel-final stems.

The evidence points to gemination's having become a property which is associated with particular suffixes which can be marked as triggering it. Nothing suggests that gemination be handled by a synchronic phonological rule. Linguists -- notably Bergsland and Rischel -- have nonetheless offered explanations of the phenomenon, although what they propose cannot be considered totally functional synchronically. We shall attempt to add to the discussion of gemination by adducing Alaskan evidence, drawing conclusions which may be of primarily diachronic concern.

The association of truncation with gemination is clear among the selectively truncating suffixes, yet this relationship is apparent in no other category, as shown when the locative ending -ni is compared with the fourth person morpheme -ni. Generally, the gemination triggered by the

two -ni suffixes may be related, since both involve deletion, i.e. either selective truncation before the locative or the more complex replacive behavior of the fourth person morpheme. If deletion is in some way a common denominator of the various instances of gemination -- as Rischel suggests -- it is certainly not evident synchronically with suffixes of class 1b., e.g. -vik 'place', etc., which do not cause truncation, cf. siñiqvik 'bed', and trigger gemination in vowel-final stems only, e.g. niġġivik 'table'.

This class of suffixes, i.e. 1b., upon comparison with cross-linguistic cognates, shows evidence for initial long consonants or clusters historically. The alternate West Greenlandic forms [ixxavik] and [igaffik][13] 'kitchen' are revealing of what may be an older form of the suffix containing a long consonant initially. While this form does not trigger gemination, simplification of the cluster to a single consonant gives -vik which does trigger gemination in WG [ixxavik] as well as in the Alaskan cognate iggavik. This analysis of -vik 'place' is supported by the Barrow form suvvik 'storage closet', ostensibly from su- 'do' + -vik 'place', where the full form of the suffix is found in "strong position" following the first vowel mora of the word.

Looking for similar evidence pertaining to other suffixes of this same category, we find that -ta 1p opt

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13. Geminate continuants are unvoiced in West Greenlandic.

which also triggers gemination only in vowel-final stems, is -ɬta in Central Yupik. While this morpheme never appears with an initial cluster in Inupiaq, the historical simplification of the cluster may be responsible for gemination, assuming deletion is indeed meaningful in explaining that process.

The negative imperative endings, -nak 2s and -nagu 2s-3s among them, also prove interesting in respect to their initial consonant. Their King Island cognates are -tnak and -tnagu (see 2.33), and Kobuk forms show failure of the consonant assimilation rule before these endings: mayuqnak 'don't climb!', kataknagu 'don't drop it!'. As demonstrated in Section 2.311, lack of assimilation under these conditions inevitably means that a suffix-initial stop has been deleted, cf. mayuqmiuq 'he climbs too' from mayuq- 'climb' + -pmiuq 'does also'.[14]

The imperative endings -tin/-iñ 2s and -(r)uŋ 2s-3s belong to the same gemination class (1b) and similarly show a correspondence between deletion and gemination.

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14. Assimilation normally occurs before -vik 'place' in Kobuk, e.g. isiġvik 'stovepipe' from isiq- 'be smoky' + -vik, which may mean that the hypothetical historically deleted initial C of the postbase would have been a continuant, cf. WF -ffik. Some Kobuk forms containing -vik, however, have no assimilation, e.g. kakkitvik 'pincushion' and immutvik 'needle case'. These forms are based upon the nouns kakkiñ 'pin' (kaki- 'prick' + -tĩ instr) and immun 'something rolled' (imu- 'roll' + -tĩ instr) where the presence of ĩ in the instrumental postbase blocks assimilation when -vik is added.

When the suffix-initial consonant is present, e.g. makittin 'stand up!' (/makit + tin/), tuqurruŋ 'kill it!' (/tuqut + ruŋ/), or when a stem-final consonant is not deleted, e.g. mayuġiñ 'climb!' (/mayuq + iñ/), mayuġuŋ 'climb it!' (/mayuq + (r)uŋ/), gemination is not found. In vowel-final stems, however, the suffix-initial consonant is absent and gemination occurs, e.g. niġġiiñ 'eat!', niġġiuŋ 'eat it!'. Analysis of these imperative inflections is otherwise fraught with problems because of their aberrant allomorphy.

The -tin and -iñ allomorphs of the 2s imperative inflection are odd in that they represent a case of alternation between I and i before an alveolar, resembling the plural case. In the -tin allomorph used with t-ending verb stems, I is possibly prevented from becoming /i/, since /i/ may never occur following t (see 3.32 and 4.63). The loss of the suffix-initial consonants in imperative endings with velar and uvular ending stems (mayuġiñ 'climb!') must be explained by some sort of fusion of the two consonants, the stem-final and the suffix-initial, which may also account for the failure of velar deletion to apply in these forms. In any event these alternations are not productive synchronically and the point at issue here is deletion as related to gemination.

One odd fact about the first two categories of additive suffixes which condition gemination is that the selectively truncating suffixes of 1a. are all nominal in

nature while those of 1b. are verbal or deverbal. This situation relates possibly to the distribution of strong consonants.

The selectively truncating suffixes distinguish between strong and weak consonants stem-finally. The distinction appears not to apply to verb stems, however, as discussed above for the instrumental suffix -(r)(u)t(ĭ) where verb stem-final velars and uvulars both require the expanded form of the suffix. There is no evidence in verb stems for a distinction between strong and weak consonants with other suffixes either, and by comparison with nominal morphology, all verb stem-final consonants would be considered strong.

Without this distinction, there can be no difference between selectively truncating and non-truncating verbal suffixes. For instance if the Barrow deverbal gerundive -nĭq is said to be selectively truncating, it will delete no verb stem-final consonants, since all are strong, e.g. B aŋuniaġniq 'hunting' (aŋuniaq- 'hunt' + -nĭq). It is as well to call it non-truncating, in which case a distinction between these two suffix types becomes inconsequential.

Although the difference between categories 1a. and 1b. may be partially moot because of the lack of a strong-weak contrast in verb stem-final back consonants, there remains the question of the presence of gemination in vowel-final verb stems versus its absence in noun stems of a similar shape. Whereas these verb stems are prime candi-

dates for gemination with class 1b. suffixes (iggavik 'kitchen', etc.), noun stems with a final vowel almost never show gemination.

To take one case, gemination in vowel-final noun stems is triggered sporadically by the dual morpheme -k. Most duals in this instance are preferred without gemination: inik 'places$_2$', aŋutik 'men$_2$', atigik 'parkas$_2$'. Older speakers insist, however, that variants containing gemination are also acceptable: innak, aŋuttak, atikkak. Perhaps the most common example of this type is irrak 'eyes$_2$' (/irïk + k/) which is preferred by many to the alternative form irik. It seems likely that gemination in duals with vowel final stems is an analogical innovation which has developed under pressure from the rest of the nominal dual paradigm where gemination is present throughout.

Although gemination in vowel final nouns appears sporadic at best, there exists an archaic denominal suffix -k 'get, acquire' which triggers gemination in these stems, e.g. niqqak- 'to get meat' from niqi 'meat' + -k 'get'. Here gemination is present without optional or marginal status.

The other suffixes of class 1c, the nominalizer -q and the verbal -qtu- 'overdo', definitely trigger gemination in all stem types, whereas gemination in some dual forms is marginal as has been shown. Of other suffixes which habitually truncate stem-final consonants, the behavior of -q and -qtu- comes closest to that of the replacive suffixes

of class 2 forms. In fact, these two suffixes may be shortened variants of fuller morphemes, viz. -nïq nom and -niqtu (-niq nom + -tu intensifier) respectively. This analysis is found in Bergsland (1955:100-101), who cites the same suffixes for West Greenlandic where they trigger gemination similarly. A form such as siññaqturuq 'oversleeps' would then be derived from /siñïnïqturuq/, with gemination in the former again resulting from the deletion of suffix-initial segments, i.e. -ni in this case.

It must be emphasized that the suffixes -q and -qtu do not engage in replacive suffixation as we know it elsewhere. First of all, in replacive suffixation the vowel which follows the initial consonant of the suffix replaces the last vowel of the stem, cf. iññiq- 'have people' (from iñuk + -liq) where the u of the stem is lost. If we assume that -q is derived from -niq, we must nonetheless realize that upon suffixation, stem vowels are preserved and only the suffixal q is attached, e.g. saluk- 'be thin' and salluq 'thin person' where the last vowel of the derived form must be from the stem and not the suffix. In addition, -q and -qtu do not produce interchangeable doublets as is the case with most replacive suffixes, which can also be added as simple truncating type suffixes; thus, *siñiniqturuq is not an equivalent variant of siññaqturuq, and niġiñiq 'act of eating' and niġġiq 'eaten-away place' exist with quite different meanings. Rather than deny the derivation

of -q from -nïq, these facts suggest that what are originally allomorphs have become synchronically separate, lexicalized morphemes.

6.6 Conclusion

A medial stem consonant may be subject to gemination subsequent to the loss of a consonant at the following morpheme boundary. This consonant may be truncated stem-finally, as in amiq/ammich 'skin, sg and pl', or else be the initial consonant of a succeeding suffix which has been lost or shortened, as niġġiñak 'don't eat!' from /niġi- + Cnak/ or niġġivik 'table' from /niġi + Cvik/. The stem-final vowel and consonant may be deleted along with a suffix-initial consonant in replacive suffixation, as kammi 'his own boot' from /kamĭk + ni/.

Gemination is found preceding only the last single vowel of a morpheme and if a cluster or long consonant is present in this position there is no change. If another vowel precedes the vowel in question, a deleted consonant may "re-emerge" in geminate form, as puggut 'sacks' from puuq sg. In some forms, gemination fails to apply regularly, as in unii- 'make a sled' from /uniaq + li/, with no possible variant of the shape *uniCCi- corresponding to qayyi- 'make a kayak' from /qayaq + li/. K unirrat 'sled', however, does show a geminate.

Segments may be exempt from gemination as demonstrated in Section 5.343 for some ŧ's, as in K auraq

'summer', auram rel sg (not *aurram) or niġiraq 'eaten thing', niġirat pl (not *niġirrat).

To say that gemination depends upon loss of a consonant, or entire syllable in the case of replacive suffixation, later in the word accounts for a majority of the instances of gemination as well as providing a seemingly "natural" motivation for this process. Loss of a consonant at one point conditions gemination of a preceding consonant, a mechanism of compensatory lengthening. While Rischel's solution to the problem is similar, he allows gemination to be conditioned by either a consonant or a vowel. Vowel loss ostensibly conditions gemination in instrumentals such as iggan 'cooking utensil' from /iga + (u)t(ĭ)/ where the suffix-initial vowel is lost. Evidence in Greenlandic is stronger than in Alaskan Inupiaq, however, for gemination as a consequence of vowel loss.[15] Since we analyze the instrumental suffix as underlyingly consonant initial, viz. /rutĭ/, the gemination in iggan 'cooking utensil' and related forms may still be due to consonant loss.[16] Rischel also considers a comparable analysis, attributing gemination in such forms to simplification of /-CutĪ/ to /-t(V)/

15. The West Greenlandic alternants sannappaa, sanaappaa 'makes something for him or in his place' show gemination of the stem consonant when a succeeding vowel is lost (Rischel 1974:288).

16. The relic form niġrun 'animal' is probably based on the archaic Inupiaq stem for 'eat' which was nĭġĭ-, rather than modern nĪġi-, cf. CY neRe-. The instrumental postbase appears here in full form with an initial ĭ, the stem-final Ī having been syncopated.

(1974:288).

The "consonant deletion hypothesis" for gemination encounters its main difficulty in that a great many consonants are deleted at morpheme boundaries without the compensatory device of gemination. Velar deletion, for example, occurs in the derivation of saviich 'knives' (/savik + it/) without gemination of the medial stem consonant. A comparable intervocalic C deletion in niġġiuŋ 'eat it!' from /niġi + ruŋ/ does trigger gemination. This state of affairs may indicate that these rules belong to different historical strata, so that velar deletion is too recent to interact with gemination, which was no longer purely phonological in nature by the time of the advent of the former. Both internal and comparative evidence show velar deletion to be more transparent synchronically than the alternation with zero of the initial consonant of the 2s imperative suffix -ruŋ, indicating that the latter probably is older. A more complete exposition of this question is of interest but would take us well beyond the point which is to be made here.

Most disconcerting to any analysis of gemination are the numerous truncating suffixes which engender no compensatory consonant lengthening elsewhere in the word. Of course the majority of cases of gemination have been found to result not from (selective) truncation but from other types of deletion, cluster simplification, etc.

Some archaic phonological process -- or processes -- is doubtless responsible for the deletions which condition gemination, and a true understanding of the gemination mechanism depends on a thorough reconstruction of the Proto Inupiaq consonant system and related rules, e.g. consonant gradation.

Only selective truncation and not truncation *per se* has been found to trigger gemination. It seems certain that what we have called selective truncation does not involve truncation in the same sense as that found before other suffixes. The consonant deletion of *qayyamik* 'kayak mod sg' which presumably causes gemination is probably related instead to the cluster simplification which conditions gemination in forms like *niġġiñak* 'don't eat!', although in appearance the former deletion resembles closely what is ordinary truncation.

Conclusion

It is the goal of this work to have presented a systematic account of North Alaskan Inupiaq phonology based on data from the Barrow and Kobuk dialects. Our analysis of the language is intended to be synchronically valid, although often we have looked at problems from a diachronic perspective as well. With a conservative dialect as our base, we have on several occasions tried to reconstruct former states of the language, discussing possible earlier sources or origins of synchronic problems. In fewer instances, we offer observations on contemporary changes within Inupiaq or probable future developments. Innovative dialects may be said to deviate radically and on numerous points from what we describe as a sort of conservative norm. The change is indeed startling when one considers that it has taken place over the course of one or two generations only.

Any treatment of innovative speech found here is characterized by some degree of reticence on our part because of the important role which the influence of English has played in conditioning language change and our uncertainty as to what manner of consideration this influence should be

given. While the increased use of English in Inupiaq areas has had a dramatic effect on the status of the indigenous language as primary means of communication, it is difficult to gauge the effect on Inupiaq grammar. Of course we expect the language to change, but it is unclear to what extent the sweeping changes which are taking place in Inupiaq are a result of English directly, be it aspects of English grammar according to which Inupiaq is altered or the general fact that increased use of English may threaten Inupiaq native language competence in some cases.

It is an interesting question whether contact with English has merely hastened changes which are "natural" for the language or inspired entirely new directions of change. There are probably cases of both. For instance, the Barrow neologism ukkusik for utkusik 'cooking pot' illustrates regressive assimilation of a stop cluster. As we have shown in Chapter II, regressive assimilation is a totally natural process for Barrow, although it does not normally affect clusters of stops (however, cf. B ikkat- and PB iṭkat- 'be shallow'). In West Greenlandic regressive assimilation has been generalized to apply to nearly all clusters, and the same tendency is demonstrated in the innovative Barrow form ukkusik.

An additional example of a phonological change taking place in Inupiaq is provided by the case of strong and weak ġ which is discussed in Chapter VI. The distinction

between two types of g exists in all Eskimo languages, although in none that we know of is a phonetic difference clearly evident which might explain this dichotomy. By all appearances, the distinction has been preserved for a long time in the absence of its original phonological conditioning, making it a prime target for restructuring to a single segment with consistent phonological behavior. That change is occurring now -- in both Central Yupik and Alaskan Inupiaq, at least -- so that nearly all speakers except the fairly conservative recognize only one type of g. This change seems totally predictable, but we wonder to what extent its rapidity depends on factors from outside Inupiaq.

A change we have suggested as possibly due to analogy with English (see 3.252) is the loss of most palatals in younger speech. Phonetic change of this sort can also be documented with younger speakers, who pronounce the traditional [ř] as a retroflex, resembling its English equivalent. Language change, along with the socio-linguistic questions it entails, is an important issue for Inupiaq and one which we have barely been able to treat here.

Another interesting linguistic phenomenon which has scarcely been discussed thus far is loan words. The omission of this topic from the body of the thesis is conscious, since we feel that loan words in Inupiaq do not behave in a very systematic fashion and thus prove nothing

with certainty; many loans do however lead to conjecture about the phonological processes we describe, and we present that conjecture here.

To begin with, let us note some vowel correspondences between English and Inupiaq as apparent in loans: English [ʌ] and [ə] are rendered in Inupiaq as [a], e.g. kala 'color', pata or para 'butter', K hat- 'hunt'.[1] The equivalent of English stress is Inupiaq vowel length: B aapu 'apple', B kaapi 'coffee', siɬaavyak 'pancake' (from 'slapjack').

Loans which may be expected to trigger the palatalization rule include B tii 'tea', since [i:] may not normally be followed by alveolars. Tii in fact does not cause palatalization of a following alveolar, cf. B tiiliuġun 'tea pot' from tii + -liuq- 'make' + -utĭ instr. There is nothing in the structure of this form, however, to show that it has become an Inupiaq word and lost its foreign status. Siɬaavyak 'pancake' gives a good indication that palatalization is indeed associated with the sequence #si- as discussed in Section 3.32. The initial cluster of 'slapjack', which is disallowed in Inupiaq, is broken up

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1. This form seems to violate all expectations of what sort of words are normally borrowed into a language. Hat- 'hunt' is indeed a borrowing which is well integrated into Upper Kobuk Inupiaq and distinct from the anglicisms which are otherwise used.

by vowel epenthesis.[2] It is perhaps significant that it is /i/ that is inserted following #s, although epenthetic vowels in loan words adhere to no easily discovered principle, cf. B palauvak 'flour'. B aiñaq 'onion' is of particular interest. It has been shown that English [ʌ], the initial vowel of onion, typically corresponds to AI [a]. Why then the initial diphthong in aiñaq? Since a sound closely resembling Inupiaq [ñ] is present in the English form, and given the expected vowel correspondences, the predicted borrowing would be *añaq. In the actual form, however, the environment for palatalization, i.e. a preceding /i/, seems to be recreated in the form of the diphthong ai which precedes ñ.

Some loan words appear to attest the synchronic reality of Rule 5 which accounts for the n/tĭ alternation found in forms such as aŋun/aŋutit 'man, sg and pl'. B paluun 'balloon' is paluutik in the dual and paluutit in the plural, at least for some speakers. K kayuun 'coyote' (kayuutik dl, kayuutit pl) seems to be a back formation from English, i.e. 'coyote' is borrowed as kayuutĭ (see 4.54).

The pair manik 'money' and tanik 'white man' seem both to be borrowings. Tanik is used nowhere in the Eskimo

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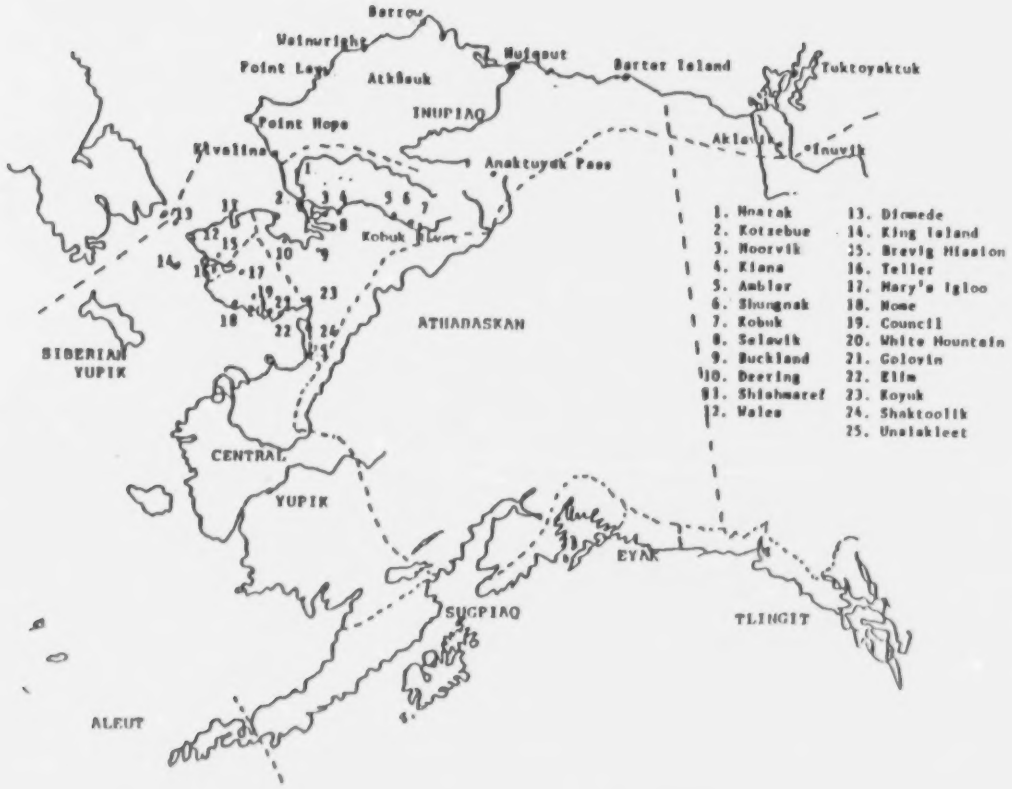
2. Rischel (1974:437), in a discussion of a similar case of epenthesis in West Greenlandic loan words, makes the point that no rule of Inupiaq tells speakers how to process initial clusters.

world but Barrow and is most often said to derive from 'tonic' with aspersions -- doubtless justified -- cast upon the sobriety of the first whites whom the Inupiaqs encountered. Pete Sovalik of Barrow, however, believes this word to be derived from 'Dansk', which Danish whalers used to identify themselves. The crucial point here is that manik contains /i/, cf. maniksuq 'is rich, has gotten money', while tanik has an /Ī/, cf. tannak dl, tanǫich pl. Why this difference should exist is uncertain, except that the i in tanik is epenthetic, while that in manik is not. In other words, 'Dansk' was treated like the cluster-final allomorphs of stems with penultimate Ī, e.g., the syncopated form of atiq 'name' which is atq- as in atqich pl.

In this way loan words often seem suggestive of possible phonological analyses which may be proposed for Alaskan Inupiaq. Generally however, evidence from loans is probably insufficient to be taken as conclusive, although the examples discussed above seem to offer minor support for claims we have made as to whether certain phonological processes may be considered productive.



APPENDIX 1: Map of Alaska (showing villages where Inupiaq is spoken)

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APPENDIX 2: List of Rules

(with a notation of the section where each rule originally appears)

(2.21) 1. Regressive assimilation

$$C \rightarrow \begin{bmatrix} \alpha \text{ continuant} \\ \beta \text{ voice} \\ \gamma \text{ nasal} \end{bmatrix} \quad / ____ \quad \begin{bmatrix} \alpha \text{ continuant} \\ \beta \text{ voice} \\ \gamma \text{ nasal} \end{bmatrix}$$

(2.21) 2. Barrow regressive assimilation

$$\left[\begin{matrix} C \\ \langle - \text{ back} \\ \langle + \text{ coronal} \rangle \rangle \end{matrix}\right] \rightarrow \left[\begin{matrix} \alpha \text{ continuant} \\ \beta \text{ voice} \\ \langle \gamma \text{ nasal} \\ \langle \delta \text{ lateral} \rangle \rangle \end{matrix}\right] \quad / ____ \quad \begin{bmatrix} \alpha \text{ continuant} \\ \beta \text{ voice} \\ \gamma \text{ nasal} \\ \delta \text{ lateral} \end{bmatrix}$$

(2.3) 3. Kobuk regressive assimilation

$$C \rightarrow \begin{bmatrix} \alpha \text{ continuant} \\ \beta \text{ voice} \\ \gamma \text{ nasal} \\ \delta \text{ lateral} \end{bmatrix} \quad / ___^{+} \quad \begin{bmatrix} \alpha \text{ continuant} \\ \beta \text{ voice} \\ \gamma \text{ nasal} \\ \delta \text{ lateral} \end{bmatrix}$$

(2.31) 4. Cluster simplification

$$C \rightarrow \emptyset / C ___ C$$

(2.32) 5. Stem-final nasalization

$$\begin{bmatrix} C \\ + \text{ coronal} \\ - \text{ continuant} \end{bmatrix} \rightarrow \begin{bmatrix} + \text{ nasal} \\ + \text{ continuant} \end{bmatrix} \quad / ___ \# \text{ in singular nouns}$$

(2.4) 6. Progressive assimilation

$$C \rightarrow \begin{bmatrix} \alpha \text{ continuant} \\ \beta \text{ voice} \\ \gamma \text{ nasal} \end{bmatrix} \quad / \quad \begin{bmatrix} \alpha \text{ continuant} \\ \beta \text{ voice} \\ \gamma \text{ nasal} \end{bmatrix} ___^{+}$$

(2.5) 7. Assimilation

$$C \rightarrow \begin{bmatrix} \alpha \text{ continuant} \\ \beta \text{ voice} \\ \gamma \text{ nasal} \\ \delta \text{ lateral} \end{bmatrix} \quad / \quad \begin{bmatrix} C \\ \alpha \text{ continuant} \\ \beta \text{ voice} \\ \gamma \text{ nasal} \\ \delta \text{ lateral} \end{bmatrix} / ___^{+}$$

(3.24) 8. Palatalization of alveolars

$$\begin{bmatrix} C \\ + \text{ coronal} \\ \alpha \text{ continuant} \\ \alpha \text{ sonorant} \end{bmatrix} \rightarrow [+ \text{ high}] \quad / \quad \begin{bmatrix} V \\ + \text{ high} \\ - \text{ back} \end{bmatrix} \quad (C) ___$$

(3.24) 9. Assibilation

$$\check{c} \rightarrow s / ____ V$$

(4.21) 10. Vowel lowering

$$\bar{I} \rightarrow a / ____ V$$

(4.54) 11. Syncope of penultimate $\bar{I}$

$$\bar{I} \rightarrow \emptyset / VC ____ \begin{Bmatrix} k \\ q \end{Bmatrix} + V$$

(5.23) 12. Lenition

$$\begin{bmatrix} C \\ - \text{ continuant} \end{bmatrix} \rightarrow \begin{bmatrix} + \text{ continuant} \\ + \text{ voice} \end{bmatrix} \quad / VC_{o}V ____ V$$

(5.332) 13. Velar deletion

$$\begin{bmatrix} C \\ + \text{ back} \\ + \text{ continuant} \end{bmatrix} \rightarrow \emptyset / \begin{Bmatrix} \# \\ C \end{Bmatrix} \left\langle \begin{bmatrix} V \\ \langle - \text{ high} \rangle \\ \langle + \text{ back} \rangle \end{bmatrix} \right\rangle ____ V$$

(6.211) 14. Velar deletion at morpheme boundaries

$$\begin{bmatrix} C \\ +\ back \end{bmatrix} \rightarrow \emptyset / C \begin{bmatrix} V \\ \langle -\ high \rangle \\ \langle +\ back \rangle \end{bmatrix} \quad \underline{\quad\quad} +V$$

(6.211) 15. Lenition at morpheme boundaries

$$\begin{bmatrix} C \\ +\ back \\ -\ continuant \end{bmatrix} \rightarrow \begin{bmatrix} +\ continuant \\ +\ voice \end{bmatrix} \quad / \ V \underline{\quad\quad} +V$$

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